

10

History-Social
Science Standard
10.4.1.



Supporting Materials
California Education and the Environment Initiative



New Imperialism: The Search for Natural Resources

DRAFT

for discussion purposes only

California Education and the Environment Initiative

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Contents

Assessments

Search for Natural Resources—Traditional Unit Assessment Master	4
Newspaper Article—Alternative Unit Assessment Master.	8

Lesson 1 The Hydrogen Highway—Parallels with Industrialization

Activity Masters

Key Unit Vocabulary	11
<i>California Connections: Paving the Way for a Cleaner Tomorrow</i>	13
Parallels of Industrialization and the Hydrogen Highway.	17

Lesson 2 Natural Resources in an Industrial Economies

Activity Masters

Evaluating the Need for Natural Resources in Industrial Economics	18
Industrialization Links	23

Visual Aids

1 Richard Trevithick's 1804 Locomotive	28
2 Cotton Warper.	29
3 Telegraph Lines, 1891	30
4 Bessemer Process Furnace, 1898	31
5 Chicago Business District, 1898	32

Lesson 3 Growing Rubber in the Brazilian Amazon for Growing Industries

Activity Masters

Growing Rubber for Growing Industries	33
---	----

Visual Aids

6 Wild Rubber in the Brazilian Amazon	38
7 Human Innovation and the Changing Uses of Rubber	40
8 The Automobile Industry	42
9 Consumer Demand for Rubber Products	44
10 The Decline of Amazonian Wild Rubber Production	46
11 Plantation Rubber in the Amazon Basin	48

Lesson 4 Opinions about Control and Use of Natural Resources

Activity Masters

Concept Definition Map	50
Primary Source Analysis Form	51
John G. Paton 1883	53
Paul Leroy-Beaulieu 1891	54
Sir F. Lugard	55
David Livingston 1858	56
Differering Opinions: The Control and Use of Natural Resources	57

Visual Aids

12 Concept Definition Map	59
--	----

Lesson 5 Conservation Efforts in British India

Activity Masters

Conservation in British India	60
Conservation in Contemporary California	62
Comparing Conservation in British India and Contemporary California	64

Visual Aids

13 Conservation Efforts in British India—Warm Up	65
14 Comparing Conservation in British India and Contemporary California . .	66
15 Conservation Efforts in British India—Closing	67

Lesson 6 Quinine and the Global Implications of Imperialism

Activity Masters

Part I—Mapping the History of Quinine	68
Quinine and the Global Implication of Imperialism	71
House of Commons Parliamentary Papers Enclosure to No. 13	72
Part II—Putting It All Together	73

Visual Aids

16 Quinine and the Global Implication of Imperialism	75
---	----

Search for Natural Resources

Traditional Unit Assessment Master | page 1 of 4

Name: _____

Matching Instructions: Match each vocabulary word in the box with its correct meaning. Write the letter of the vocabulary word on the line to the left of the definition. (2 points each)

- | | |
|-----------------------|--------------------|
| a. missionary impulse | f. infrastructure |
| b. fossil fuels | g. quinine |
| c. industrialization | h. biodiversity |
| d. Social Darwinism | i. ecosystem goods |
| e. ecosystem services | j. conservation |

- _____ 1. A powder extracted from the bark of *Cinchona* trees and used as a treatment for malaria.
- _____ 2. The changing of an area by creating industry, such as factories and power plants.
- _____ 3. The desire of religious figures to spread their religion, particularly Western Christianity, and teach natives about Western ways.
- _____ 4. The management, protection, and use of resources and natural systems to meet current and future needs.
- _____ 5. A biological explanation using Darwin's theory of natural selection to explain why some social groups maintain an advantage over others.
- _____ 6. The functions and processes that take place in natural systems, such as pollination, that support or produce goods and help sustain human life, economies, and cultures.
- _____ 7. Non-renewable fuels such as coal that formed over millions of years from decayed organic material.
- _____ 8. Tangible materials such as timber and food produced by natural systems that are essential to human life, economies, and cultures.
- _____ 9. The basic facilities and systems such as railroads and power lines necessary to run an industrial economy.
- _____ 10. The variety of life over some spatial unit, used to describe all aspects of the broadly diverse forms into which organisms have evolved, especially species richness, ecosystem, complexity, and genetic variation.

Name: _____

Multiple Choice Instructions: Select the best answer and circle the correct letter. (2 points each)

11. Californians are seeking alternative energy sources in the 21st century because:
 - a. oil reserves are depleting.
 - b. the United States gets oil from politically unstable regions.
 - c. use of oil causes harm to the environment.
 - d. all of the above
12. One of the first conservation movements began in late 19th century in:
 - a. Germany.
 - b. Britain.
 - c. India.
 - d. South Africa.
13. What effect did urbanization have on the demand for natural resources?
 - a. Demand increased.
 - b. Demand decreased.
 - c. Demand stayed the same.
 - d. The change in demand was not noted.
14. All of the following are essential roles of natural resources for industrialization except:
 - a. fuel for industrial machinery.
 - b. medicinal remedies for epidemic diseases.
 - c. food for growing population in imperial country.
 - d. resources for luxury goods.
15. The practice of completely clearing wooded areas of vegetation and forest cover is called:
 - a. erosion control
 - b. denudation
 - c. conservation
 - d. global warming
16. How did quinine contribute to the expansion of imperialism in Africa?
 - a. It decreased the mortality rate of European explorers and soldiers.
 - b. It provided a transportation method for navigating the rivers.
 - c. It allowed Europeans to easily defeat their African enemies in battle.
 - d. It offered an easy way for Europeans administrators to communicate.
17. What accounted for the decrease in rubber production in the Amazonian Basin?
 - a. Demand for rubber decreased in the United States.
 - b. Plant disease destroyed the rubber trees.
 - c. Revolts by laborers stopped production.
 - d. Laborers lost their tools and could not tap the trees.

Name: _____

18. All of the following are natural resources that were used to provide raw materials for manufacturing goods except:
- a. cotton
 - b. natural rubber
 - c. palm oil
 - d. coal
19. All of the following are reasons why government regulations are necessary in monitoring the control and use of natural resources EXCEPT:
- a. Demand for natural resources has never been greater.
 - b. Overuse of natural resources can destroy them altogether.
 - c. Irresponsible use of natural resources can cause harm to the environment.
 - d. Natural resources will always be around and can be handed out equally.
20. An example of an ecosystem service is:
- a. deforestation
 - b. a transportation network
 - c. desertification
 - d. pollination

Short Answers Instructions: Read the question and write an organized answer in the space provided.
(5 points each)

21. How did the increased desire of some countries to create industrial economies lead to imperialism and colonialism?

Name: _____

22. Explain the role that two of the following played in making decisions about the control and use of natural resources.

- Social Darwinism
- Missionary impulse
- Strategic advantage

23. How do ecosystem goods and ecosystem services work together in a natural system to support human life?

Name: _____

Your newspaper editor has sent you off to one of the colonies to interview a leading European colonial administrator about the economics of colonial life. Armed with a month's supply of quinine and your favorite notebook, you set off in search of a colonial administrator who will sit down and chat with you. You are really nervous because your editor gave you few specifics besides, "Find out about all those natural resources!" You must ask the right questions to truly understand the relationship your country has with the colony. If successful, your editor has promised a front-page feature article!

Instructions

1. Use the information you gathered in the preceding lessons (for example, **Evaluating the Need for Natural Resources in Industrial Economies** in Lesson 2, **Opinions about Control and Use of Natural Resources** in Lesson 4) to think of four questions to ask the colonial administrator.

To help you write your questions, here is a summary of what we examined in the unit:

- the role of natural resources in fueling industrial economies
- the way in which the extraction, transport, and consumption of resources affected the natural systems and economies in the colonies
- the political, social, environmental, and economic roles that influenced decisions about the control and use of natural resources
- government policies that controlled some aspect of natural resources

2. Pretend that you are the colonial administrator, and give a detailed answer for each question.
3. Write an interview script.
4. Write a newspaper article that provides your fellow citizens back home with a glimpse of the relationship between the conveniences of life and the natural resources in the colonies. You should use the interview to explain your country's reliance on the colony. Your article should be between 150 and 200 words.

Here are the parts of a basic newspaper article:

- headline
- guiding question (What is the purpose of writing this article for your audience?)
- the five Ws (who, what, where, when, and why)
- catchy details
- conclusion

5. Look at the **Newspaper Assignment Scoring Tool** to ensure that you have completed the assignment as specified. Attach the scoring tool to your final draft.

Newspaper Article

Name: _____

Newspaper Assignment Scoring Tool

	Full credit looks like:	My points	Points Possible
Interview questions	Four unique questions that gather information about the interviewee's personal and professional relationship with the economics of the colony.		15
Interview answers	Four detailed answers that summarize what you have learned in this unit		20
Article headline	Wording that catches the attention of the reader and relates to the topic.		5
Article guiding question	Asks a relevant summary question about the relationship between natural resources, industrial nations, and industrial nations' colonies.		10
Article information	Provides readers with relevant details at the beginning of the article (answers who, what, where, when, and why).		20
Catchy details	Provides information beyond the basics (perhaps includes a quote from the interview).		20
Conclusion	Offers readers a conclusion to the story (provides insight to the guiding question).		10
Total:			100

Newspaper Article

Alternative Unit Assessment Master | page 3 of 3

Name: _____

[illegible]

Key Unit Vocabulary

Lesson 1 Activity Master | page 1 of 2

Alternative energy: Energy derived from sustainable sources, such as solar, wind, or water, rather than fossil fuels (petroleum-based fuels). Alternative fuels used for transportation include ethanol, hydrogen, and compressed air.

Biodiversity: The variety of life over some spatial unit, used to describe all aspects of the broadly diverse forms into which organisms have evolved, especially species richness, ecosystem, complexity, and genetic variation.

Botanical gardens: Public gardens that are used to collect, grow, study, and display plants from around the world.

Carbon cycle: The process by which carbon is exchanged between organisms such as plants, animals, and humans, and the environment.

Cinchona bark: The outer covering of the tree of the genus *Cinchona*, which is used to make quinine.

Conservation: The management, protection, and use of resources and natural systems to meet current and future needs.

Deforestation: The process of clearing an area of trees.

Denudation: The practice of clearing an area of vegetation and forest cover.

Ecosystems goods: Tangible materials such as timber and food produced by natural systems that are essential to human life, economies, and cultures.

Ecosystem services: The functions and processes that take place in natural systems, such as pollination, that support or produce goods and help sustain human life, economies, and cultures.

Fossil fuel: Non-renewable fuels such as coal and oil that formed over millions of years from decayed organic material.

Fuel cell: A cell that produces a direct current from a chemical reaction between hydrogen and oxygen, which creates electric energy capable of fueling machines.

Global warming: The gradual increase of the overall temperature of Earth's atmosphere caused in part by high levels of atmospheric carbon dioxide from the burning of fossil fuels.

Herbalist: A person who grows and collects herbs, and treats patients with medicinal herbs.

Industrialization: The changing of an area by creating industry, such as factories and power plants.

Infrastructure: The basic facilities and systems such as railroads and power lines necessary to run an industrial economy.

Malaria: A disease caused by a parasite called *Plasmodium* that occurs mostly in tropical areas, but can occur anywhere that mosquitoes thrive.

Medicinal plants: Plants whose parts (for example, leaves or roots) can be used to cure, heal, or relieve a medical condition.

Missionary impulse: The desire of religious practitioners to spread their religion, particularly Western Christianity, and teach natives about Western ways.

Monopoly: Sole control over a natural resource, good, or service.

National hegemony: The ability of one nation to claim leadership and influence on other countries.

National security: Active measures taken by a nation to ensure its safety.

Parasite: An organism that lives on or in a host organism, and which can only survive through the nutrients of the host.

Key Unit Vocabulary

Lesson 1 Activity Master | page 2 of 2

Quinine: A powder extracted from the bark of *Cinchona* trees and used as a treatment for malaria.

Rubber trees: A tree that is native to the Amazonian rainforest and produces the latex (milky fluid that hardens with exposure to the air) used to make rubber.

Social Darwinism: A biological explanation using Darwin's theory of natural selection to explain why some social groups maintain an advantage over others.

Strategic advantage: A position desired by nations to maintain dominance over other nations, especially geographically.

Tropical forest: A large area of trees and undergrowth in the tropics, characterized by a warm and humid climate and rich biodiversity.

Urbanization: Large-scale migration to cities, which leads to the building of infrastructure to accommodate the influx of people.

Paving the Way for a Cleaner Tomorrow



Our state's trend-setting influence is not limited to fashion. When California passed strict auto emissions laws in the 1960s, 10 other states followed suit. These efforts have dramatically improved the air quality in California's metropolitan areas. In 2004, California took the lead again by creating the California Hydrogen Highway Network (CaH2Net). The mission of this public-private partnership is to develop a "clean" transportation system.

Although the technology for hydrogen-fueled vehicles is still in early stages of development, it is one of the options that government agencies and industry are exploring as a mechanism to replace the use of fossil fuels in cars and buses.

The Hydrogen Highway Network is administered by the California Air Resources Board (CARB). The CARB is one of the 32 members of the California Fuel Cell Partnership, a collaborative of auto manufacturers, energy companies, fuel cell technology companies, and state and federal agencies. CaFCP's members work collaboratively toward commercializing fuel cell vehicles (FCV) and hydrogen fuel. Hydrogen Highway Network stations are among the 25 hydrogen stations in the state that provide fuel to the drivers who operate fuel cell vehicles in demonstration programs.

The confluence of political, geological, and environmental pressures has made the search for fossil fuel alternatives a national imperative. Much of our nation's oil supply comes from politically unstable regions. Some experts believe the world's oil reserves will be depleted

within our lifetime. In addition, the remaining oil is getting more and more difficult to extract. The increased cost of extraction means gas costs more and consumer prices increase across the board. When resources become scarce they can also trigger



Hydrogen-fueled car

more international conflict as nations jockey for control over the remaining energy supplies.

Further, the environmental effects of fossil fuel extraction, transportation, and use are significant, and not without risk of accident. Drilling, transporting, and refining oil contributes to air pollution, and can alter and contaminate ecosystems. Burning fossil fuels for energy creates greenhouse gases, such as carbon dioxide. Some of the carbon is reabsorbed by nature during the natural “carbon cycle.” Carbon, which is the backbone of life, changes form, and moves continually between animals, including humans, plants, and the environment. The rapid industrialization of the last century, however, has created a surplus of carbon dioxide and other gases. The excess gases collect in the atmosphere and contribute to accelerated rates of global warming.

Federal and state laws regulate the emission of greenhouse gases, and research is underway on alternative fuels such as ethanol, hydrogen, and batteries. Government and industry have invested billions of dollars over the last few decades to find an alternative fuel that is practical, sustainable, and clean. All alternatives have their challenges, and all are years away from being mainstream. Hydrogen is an excellent long-term solution.

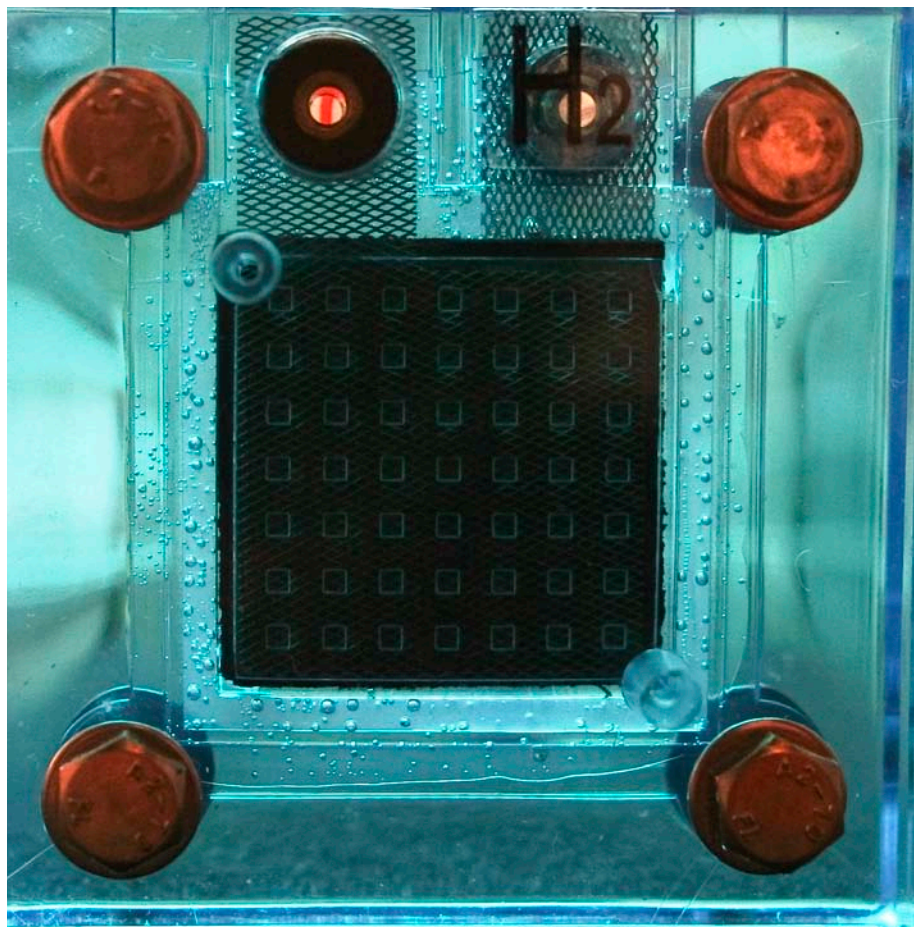
The California Hydrogen Highway Network is intent on making this vision a reality.

Building the Hydrogen Highway

CaH2Net’s two keys to success are vehicles that can run on hydrogen and having enough hydrogen to power them. Vehicles can use hydrogen in two ways: they can burn hydrogen as a conventional vehicle does or convert it to electricity in a fuel cell. Conventional cars burn gas in an internal combustion engine.

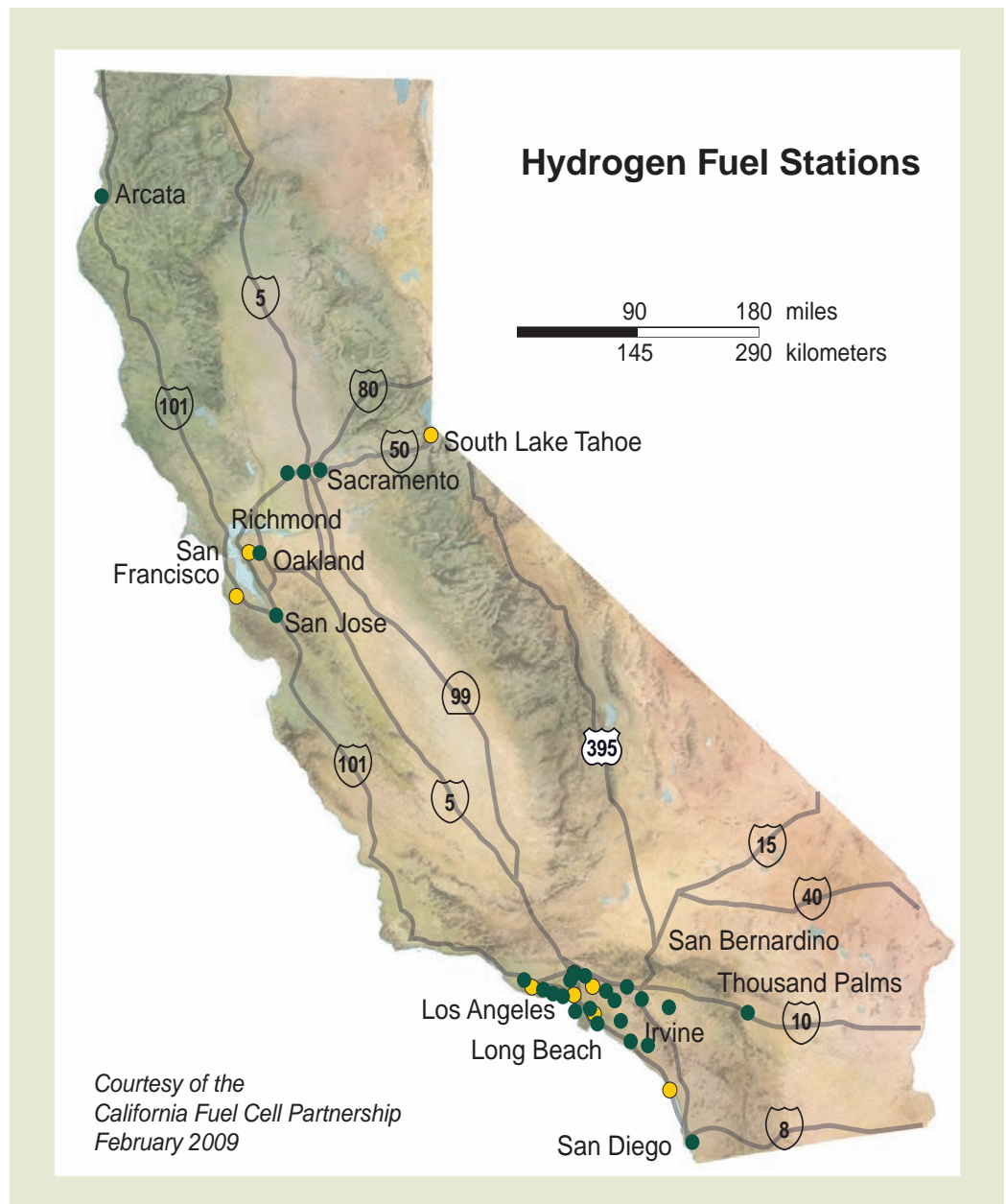
Their exhaust contains gases such as carbon dioxide, carbon monoxide, and sulfur. Hydrogen combustion engines create so few of these gases that they cannot be measured. Fuel cell vehicles produce energy efficiently without combustion. They operate like a battery that does not need to be recharged. Hydrogen FCVs create electrical energy from the attractive forces between hydrogen and oxygen. Their “waste” product is water vapor.

Thirteen-million dollars in state and federal funding was initially used to lease fuel cell buses and



Hydrogen fuel cell

build hydrogen-fueling stations in urban areas. CaH2Net envisions networks of stations in the two most populated areas of California, the greater Los Angeles and the Sacramento/San Francisco corridor. Later, stations will be built at intervals along California's major highways to provide fuel in other parts of California. The Hydrogen Highway recently reached an important milestone. By fall 2008, FCV's had driven nearly two million miles on California roads. Seven buses and almost 250 passenger vehicles have been placed on roads throughout the state. Twenty-five hydrogen fueling stations were in operation, with 11 more in planning stages or under construction.



Potential Roadblocks

To be successful, every alternative fuel must be cost effective to produce, logical to store at the station, affordable for drivers, and easy for people to put in their cars. The current demonstration projects

and ongoing research and development are exploring these issues and finding solutions.

One of the benefits of hydrogen as a fuel is the variety of sources from which it can be obtained. As with all fuels, creating hydrogen-based fuels

requires energy and produces pollution. Most hydrogen is made from natural gas, a process that releases CO₂ into the atmosphere. However, hydrogen made this way and used in a fuel cell vehicle produces 55% fewer greenhouse gases than when

gasoline is used in a combustion engine. Hydrogen fuel produced using renewable resources, like solar energy, water, and plant material, generates practically no greenhouse gases. Many hydrogen stations produce fuel at the station. This eliminates the need to transport fuel, but increases the need for novel ideas about storing hydrogen gas at the station.

Research, development, and road testing of the vehicles are proving the technology of fuel

cells. People expect vehicles to travel 300 miles on a tank of fuel and last for 150,000 miles. The auto manufacturers are making good progress towards these goals, but are several years from being ready to sell vehicles.

Federal and state governments are helping with the costs of research and development, and the early stages of manufacturing. Governments are also assisting by developing or modifying needed regulations, codes, and standards.

For example, to sell any alternative fuel, California's Department of Food and Agriculture sets the quality standards for the fuel and creates tests to measure the fuel as it is dispensed. This ensures that when people pay for fuel, they get what they are paying for.

Moving Ahead

One of many strategies for alternative fuel sources, the work behind the Hydrogen Highway Network is fueled by shared goals: creating energy security and

protecting the environment. While complex legislation and technical challenges can appear daunting, important milestones have already been reached. Broad government and industry support will help the state achieve an alternative supply of energy.

Companies are also motivated by their business interests. Auto manufacturers see a market for clean, fuel-efficient vehicles. Energy suppliers envision a diverse fuel supply that will never run out. Entrepreneurs and small business owners see a future market built upon something that does not exist today, somewhat like the market that cell phones created.

The push to develop alternatives has additional benefits. It will create new revenue sources and employment opportunities for the state's residents. Moreover, California will have made important progress in the search for cleaner, renewable, energy. California is not alone in this effort. Other states, such as Florida and New York, have hydrogen fuel programs. Hydrogen networks are underway in Canada, China, Japan, and Europe. California is leading the world in the shared vision of energy independence, environmental protection, national security, and improved public health.



Hydrogen pumping station

Parallels of Industrialization and the Hydrogen Highway

Lesson 1 Activity Master

Name: _____

Answer the following questions based on ***California Connections: Paving the Way for a Cleaner Tomorrow*** and what you already know about the Industrial Revolution. (2 points each)

1. What pressures are encouraging the development of hydrogen fuel in California?

2. Why was hydrogen chosen as a source of fuel?

3. What role do the federal and state governments play in developing the “Hydrogen Highway”?

4. Is the United States the only nation in which people are pursuing hydrogen as a fuel source?
How do you know?

5. Why do you think that some nations have access to resources including fuels while others do not?

6. What is the shared vision for the future in the attempts to create hydrogen networks, as stated in ***California Connections: Paving the Way for a Cleaner Tomorrow***?

Evaluating the Need for Natural Resources in Industrial Economies

Lesson 2 Activity Master | page 1 of 5

Name: _____

Background:

The Industrial Revolution greatly increased the need for natural resources. As countries expanded their economies and modernized their infrastructures, they required more raw materials. Limited natural resources at home motivated industrial powers such as the United States, Japan, and many European nations to look elsewhere to get the materials needed to industrialize. Industrialization included such tasks as manufacturing goods, building factories, railways, and ships, and constructing communication lines. Additionally, industrialization led to urbanization as increasing numbers of workers moved to cities where factories were located.

Most of the natural resources discussed in this lesson are ecosystem goods. These materials are essential to people because they provide such necessities as food and fuel. Ecosystem goods are made possible by ecosystem services, which are natural processes that support or produce the goods that help sustain human life, economies, and cultures. Without ecosystem services like pollination and the water cycle, people would not have the natural resources needed for their survival.

Industrial powers desired specific ecosystem goods to fulfill major functions and spur economic growth. Each of these goods depended in turn on specific ecosystem services. Natural resources were needed to:

1. Provide fuel to run industrial machines
 - ecosystem goods desired: coal, wood
 - related ecosystem services: pest and disease control, water cycle, decomposition
2. Provide raw materials for manufacturing
 - ecosystem goods desired: wood, latex (natural rubber), cotton, palm oil, iron ore
 - related ecosystem services: nutrient cycling, maintenance of diverse varieties of plants, water cycle
3. Provide food for growing population in imperial countries
 - ecosystem goods desired: wheat (grains), tea, cacao, coffee, sugar
 - related ecosystem services: nutrient cycling, pest and disease control, seed dispersal, water cycle
4. Provide medicinal remedies for epidemic diseases
 - ecosystem goods desired: quinine (medicinal plants)
 - related ecosystem services: water cycle, nutrient cycling, maintenance of diverse varieties of plants, carbon sequestration
5. Provide a “laboratory” for scientific exploration (tropical medicine, map making, forestry, agriculture, geology, botany, zoology)
 - ecosystem goods desired: plants, soils, animals
 - related ecosystem services: water cycle, nutrient cycling, maintenance of diverse varieties of plants, pest and disease control

Natural resources are the basis of industrial economies. Maintaining healthy natural systems in order to maintain natural resources, ecosystem goods, and ecosystem services, then, is a necessary part of industrialization.

Evaluating the Need for Natural Resources in Industrial Economies

Lesson 2 Activity Master | page 2 of 5

Name: _____

Activity Instructions

Each group has a stack of cards. There are four categories of cards: industrialization cards, ecosystem goods cards, ecosystem services cards, and potential problems cards. Your task is to show relationships between industrialization, the environment, and potential problems that might arise because of increased industrialization.

Follow these steps in order to demonstrate the relationships:

1. Separate your cards by category.
2. Read through the cards and discuss the ways in which some of them are related.
3. Make a “chain” by placing the cards next to each other to show the relationship between three or more of the cards.
4. On your worksheet, record the chain that your group creates by writing the title of each card.
5. Place arrows between each title. Underneath the chain, briefly describe the relationship between the cards.
6. Repeat until you create three chains. You may use the same card for more than one chain, and you do not have to use a card from each category for each chain.

For example, you might choose to link the following:

Example 1

Telegraph networks → copper → transportation networks

Industrialization: Telegraph Networks

- The telegraph was a revolutionary way to communicate over long distances.
- Telegraph lines were laid along railway lines for ease of transport.
- A telegraph cable was successfully laid across the Atlantic to relay messages between America and Europe.
- The cable required a natural latex from rubber trees native to Southeast Asia.
- The telegraph was used by the industrial nations to control some of the colonies.

Ecosystem Goods: Copper

- The use of electrical power in the 1880s increased demand for copper. It is an excellent conductor of electricity.
- Copper smelting technology in the 20th century released “acid smoke” that damaged the atmosphere. This smoke also damaged the land.
- Groundwater flowing through abandoned copper mines was tainted with acid. This acid killed the plant life that could clean the water. It also affected the underground reserves of copper.
- The second Industrial Revolution in Europe and U.S. focused on copper, which was not abundant in Europe.

Industrialization: Transportation Networks

- Steamships, railways, and telegraph networks increased the movement of people, goods, and money all over the world.
- Railways and rivers allowed trains and steamships to break into the interior regions of Africa, Asia, and Latin America. This made natural resources in the colonies more available to imperial powers.

Explanation: Telegraph networks require copper because of its ability to conduct electricity, which requires a transportation network to access the copper mines in Africa.

Name: _____

Example 2

Cotton → large-scale irrigation → desertification and salinization → carbon sequestration

Ecosystem Goods: Cotton

- Cotton was a catalyst for the Industrial Revolution in Britain.
- Mechanized cotton spinning and weaving increased demand for cotton that could be produced in large quantities.
- Britain's need for cotton and African markets influenced its power and led to both regions.
- Cotton cultivation in arid climates and where these irrigation is required.

Industrialization: Large-Scale Irrigation

- Irrigation is the artificial supply of water to crops, such as cotton.
- By the end of the 19th century, the world's food supply was largely dependent on irrigation.
- Nineteenth-century India was the first to use large-scale irrigation canals.
- Between 1870 and 1900, the area irrigated in India tripled.
- Industrial irrigation led to a buildup of salt levels, a process known as salinization. This can result in reduced agricultural productivity.

Challenges: Desertification and Salinization

- Desertification (derived from the word "desert") is the degradation of dry land. This process is caused by a combination of climatic factors and human activities. These activities include water diversion, deforestation, and overgrazing.
- Salinization is the buildup of salts in soil. It becomes toxic to plants and can happen naturally from poor irrigation practices or human activities.
- Salinization can also occur because of high levels of irrigation water.

Ecosystem Services: Carbon Sequestration

- Carbon sequestration is the process in which carbon in Earth's atmosphere is absorbed and stored in forests, soil, and the ocean.
- Oceans, forests, and soil "clean" Earth's atmosphere of extra carbon. Scientists therefore call these systems carbon "sinks."
- Deforestation and desertification can reduce the effectiveness of carbon "sinks."
- Naturally occurring carbon storage can reduce greenhouse gases that contribute to global warming.
- Fossil fuel-based industrialization has produced a surplus of carbon dioxide in Earth's atmosphere, contributing to global warming.

Explanation: As demand for textile goods increases, so does the demand for cotton. Increased cotton production requires methods of large-scale irrigation, which can contribute to desertification and salinization. Desertification can limit the process of carbon sequestration (absorption/collection of carbon in solid materials like plant tissue).

Chains of Causality

Please list your group's three chains following the examples above. (5 points each chain)

Chain: 1

Explanation:

Evaluating the Need for Natural Resources in Industrial Economies

Lesson 2 Activity Master | page 4 of 5

Name: _____

Chain 2:

Explanation:

Chain 3:

Explanation:

Respond to the following questions. (2 points each)

1. How do ecosystem services and ecosystem goods work together to produce resources that people need?

Evaluating the Need for Natural Resources in Industrial Economies

Lesson 2 Activity Master | page 5 of 5

Name: _____

2. In your own words, explain the process of nutrient dispersal and cycling.
Why is this an ecosystem service?

3. Why did industrializing nations seek natural resources in other countries?

4. Why do you think providing medicinal remedies for epidemic diseases is considered a major role of natural resources in fueling industrialization?

5. Explain the relationship between industrialization and ecosystem goods and services that you discovered in your group activity.



Ecosystem Goods: Coal

- Coal was used in smelting iron ore to make steel, an essential ingredient for industries like shipbuilding and railways.
- Coal is a fossil fuel—meaning that it is formed by natural processes over a long period of time. Coal is considered nonrenewable because it takes such a long time for nature to make more.
- Coal mining increased 100 fold during the 19th century. Coal was primarily used in steam-powered ships and railroad engines.
- Burning coal often cause air pollution.
- Burning coal releases carbon dioxide into Earth’s atmosphere and can increase the rate of global warming and lead to global climate change.

Ecosystem Goods: Wood

- By the end of the 18th century, coal replaced wood as the primary fuel for iron smelting. Iron and steel replaced wood as main building materials.
- The use of paper products such as newspaper, books, and toilet paper greatly increased as a result of the Industrial Revolution.
- Urbanization led to more demand for wood for the construction of homes and paper products.
- Machinery made from iron and powered by coal (such as steamboats and railroads) increased access to forests. This revolutionized transportation of timber to manufacturing centers and the delivery of finished products to markets.



Ecosystem Goods: Cotton

- Cotton was a catalyst for the Industrial Revolution in Britain.
- Mechanized cotton spinning and weaving increased the amount of cloth that could be produced. This increased the need for raw cotton.
- Britain’s need for access to Indian and African markets to sell cotton influenced its role as an imperial sea power and led to colonization efforts in both regions.
- Cotton cultivation requires temperate climates and well-distributed rainfall. Where these conditions do not exist, irrigation is required.

Ecosystem Goods: Copper

- The use of electrical power in the 1880s increased demand for copper. It is an excellent conductor of electricity and is a logical element to use in power lines.
- Copper smelting techniques used into the 20th century released sulfur into the atmosphere. This created “copper smoke” that damaged crops and animals.
- Groundwater flowing through abandoned copper mines can become tainted with acid. This can affect animal and plant life that comes in contact with the water. It also affects water quality in underground reserves.
- The second Industrial Revolution made European and U.S. factories reliant on copper, which was not available locally in Europe.





Ecosystem Goods: Medicinal Plants

- Medicinal plants are used to treat human illnesses.
- About half of all prescriptions in the U.S. and Europe contain at least one ingredient derived from plants.
- Deforestation dramatically reduces the varieties of plants in a specific area. It can directly eliminate medicinal plants, some of which might not have been catalogued yet.
- Quinine comes from the bark of the *Cinchona* tree from tropical South America. It was an important treatment for malaria when European countries colonized Africa in the 19th century.

Industrialization: Large-Scale Irrigation

- Irrigation is the artificial supply of water to crops, such as cotton.
- By the end of the 20th century, 40% of food worldwide was watered by irrigation.
- Nineteenth-century irrigation was the first to use large-scale dams and irrigation canals.
- Between 1870 and 1900, the British tripled the area irrigated by the Indus River in India.
- Industrial irrigation can lead to the buildup of salts in the soil to damaging levels, a process called salinization. This can result in degraded soils and reduced agricultural productivity.



Industrialization: Electricity

- Electricity was a new source of cheap energy in the 19th century.
- Prior to the use of electricity, factories needed to be near running water. With electricity, manufacturers no longer had to be close to an energy source.
- The transport of electrical power long distances required power lines made of copper.

Industrialization: Transportation Networks

- Steamships, railways, and telegraph networks increased the movement of people, goods, and money all over the world.
- Railways and rivers allowed trains and steamships to break into the interior regions of Africa, Asia, and Latin America. This made natural resources in the colonies more available to imperial powers.





Industrialization: Telegraph Networks

- The telegraph was a revolutionary way to communicate over long distances.
- Telegraph lines were often built next to railway lines for ease of construction.
- A telegraph cable was used successfully in the mid-19th century to relay messages between North America and Europe.
- The cable required copper, hemp, iron, and a natural latex from a tropical tree native to Southeast Asia.
- The telegraph was used throughout the industrial nations; use extended to some of the colonies as well.

Industrialization: Urbanization

- Urbanization is the process in which increasing numbers of people live in cities rather than rural areas.
- The Industrial Revolution required increased human labor, so people migrated from farms to cities throughout northern Europe.
- Technological advances in the cotton and iron industries contributed to urbanization in Europe.
- By 1900, 80% of Britain's population, 60% of Germany's population, and 50% of the U.S. population lived in cities.
- Urbanization increases human pressures on the local environment, such as air and water pollution.
- Today, more than 50% of the world's 6 billion people live in cities.



Challenges: Air and Water Pollution

- Nineteenth century industrialization produced record amounts of air pollution from burning coal in textile mills and steel plants.
- In the 20th and 21st centuries, air pollution is closely associated with urbanization because of the high use of automobiles in cities.
- Severe air pollution can make some environments too toxic to support vegetation.
- Water pollution in the 19th century was largely the product of natural resource exploitation, industrialization, urbanization, and agriculture.

Challenges: Deforestation

- Deforestation is the process of clearing an area of trees.
- Although the deforestation of tropical regions is a large problem today, most of the world's deforestation took place before 1950.
- In tropical forests, harvesting tree crops like the rubber tree (used to tap latex to make rubber products) eventually led people to clear the land and replace the original forest with plantation crops such as sugar and coffee.
- In south and southeastern Asia between 1860 and 1950, 278,000 square kilometers (approximately 273 square miles) of forests were destroyed for cropland.



Challenges: Desertification and Salinization

- Desertification (derived from the word “desert”) is the degradation of dry land. This problem can be caused by climatic factors and human activities. These activities include over-cultivation, water diversion practices, overgrazing, deforestation, and poor irrigation.
- Salinization is the build up of mineral salts in soil. In excess, salts can become toxic to plant life. Salinization happens naturally but can also result from poor irrigation practices and other human activities.
- Salinization can make the soil infertile because plants cannot cope with the high levels of salt in the soil.

Challenges: Disease

- Urbanization in the 19th century brought with it crowd-related disease problems.
- Irrigation techniques can also create breeding grounds for disease-carrying organisms.
- Malaria is transmitted by mosquitoes. The use of quinine to treat malaria greatly reduced the impact of the disease on humans in the 19th century.

Challenges: Global Climate Change

- Global climate change refers to long-term changes in weather patterns, most recently resulting from increases in Earth’s average temperature (global warming).
- Most scientists believe that Earth’s climate is changing due to human actions such as burning fossil fuels (for example, coal) which is accelerating the natural process of global warming.
- Global warming can result in flooding, severe droughts, and storms. It can also affect agricultural production as well as threaten human populations in the path of extreme weather events.
- Population growth, and thus the increased consumption of resources like fossil fuels, has contributed to global warming.

Ecosystem Services: Carbon Sequestration

- Carbon sequestration is the process in which carbon in Earth’s atmosphere is absorbed and stored in forests, soil, and the ocean.
- Oceans, forests, and soil “clean” Earth’s atmosphere of extra carbon. Scientists therefore call these systems carbon “sinks.”
- Deforestation and desertification can reduce the effectiveness of carbon “sinks.”
- Naturally occurring carbon storage can reduce greenhouse gases that contribute to global warming.
- Fossil fuel-based industrialization has produced a surplus of carbon dioxide in Earth’s atmosphere, contributing to global warming.

Ecosystem Services: Nutrient Dispersal and Cycling

- Nutrient cycling is the process whereby nutrients such as carbon and nitrogen are recycled within a natural system.
- Soil, for example, recycles and retains nutrients from decomposition and makes them available for plant growth.
- Soil takes hundreds of years to build up this fertility and only a few years to lose it.

Ecosystem Services: Pest and Disease Control

- Pests compete with humans for food, timber, and cotton and other fibers. Pests include insects, rodents, viruses, and fungi, among other organisms.
- Perhaps 99% of potential crop pests are controlled by natural enemies such as birds, ladybugs, fungi, and other types of organisms.
- Monoculture, or the planting of a single crop over a large area, can reduce the controlling effects of natural pest enemies. Thus, humans have tried to control pests artificially through the use of pesticides. These pesticides can accumulate in water, soil, and the air, where they can threaten human and animal health.

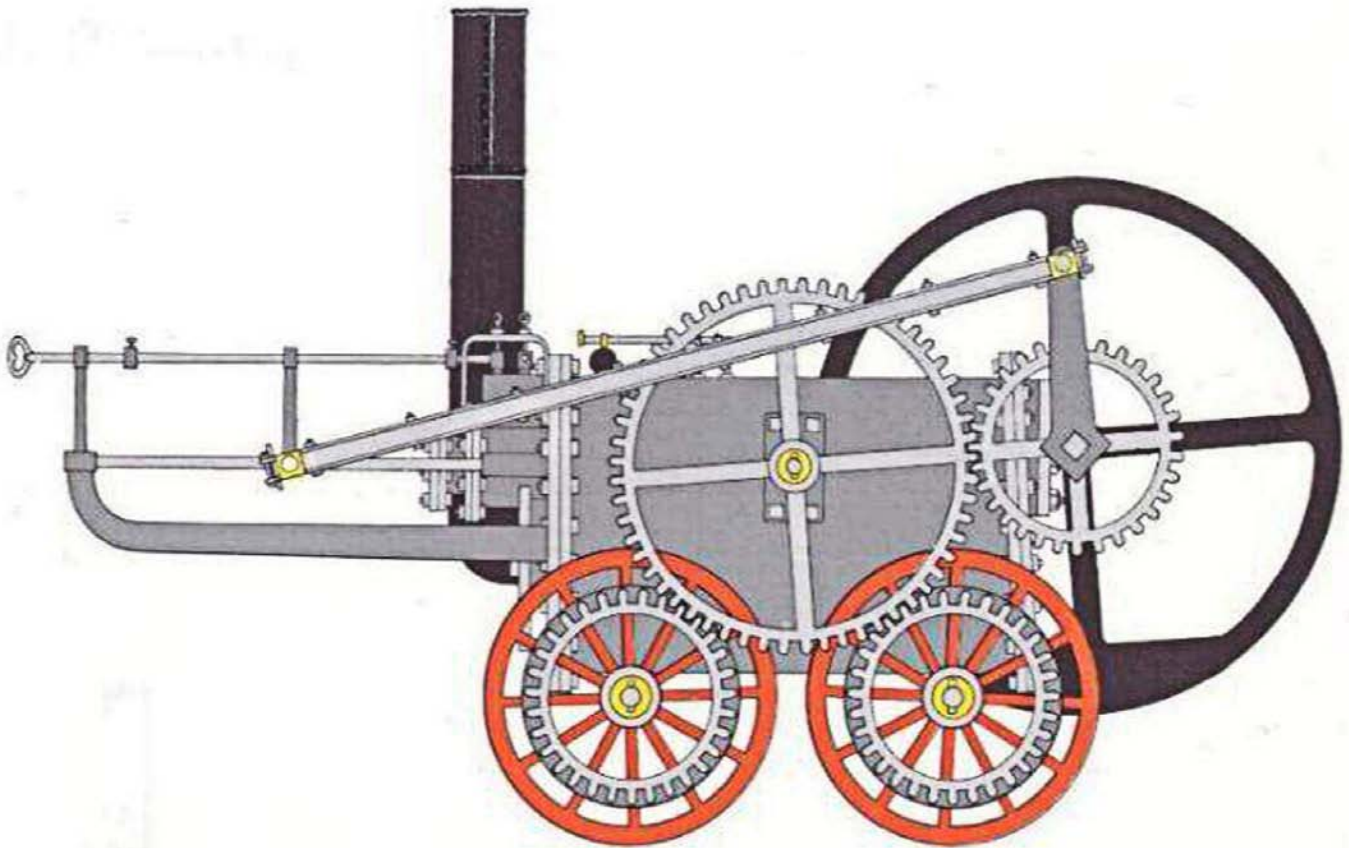
Ecosystem Services: Maintenance of Biodiversity

- Biodiversity is a measure of the variety of life forms within a given natural system.
- The tropical regions and Africa and Latin America are the most biologically diverse places in the world. They have therefore attracted the attention of outsiders for centuries.
- Many goods, such as natural rubber, spices, *Cinchona* and other medicinal plants, woods, and fibers are found in tropical regions.

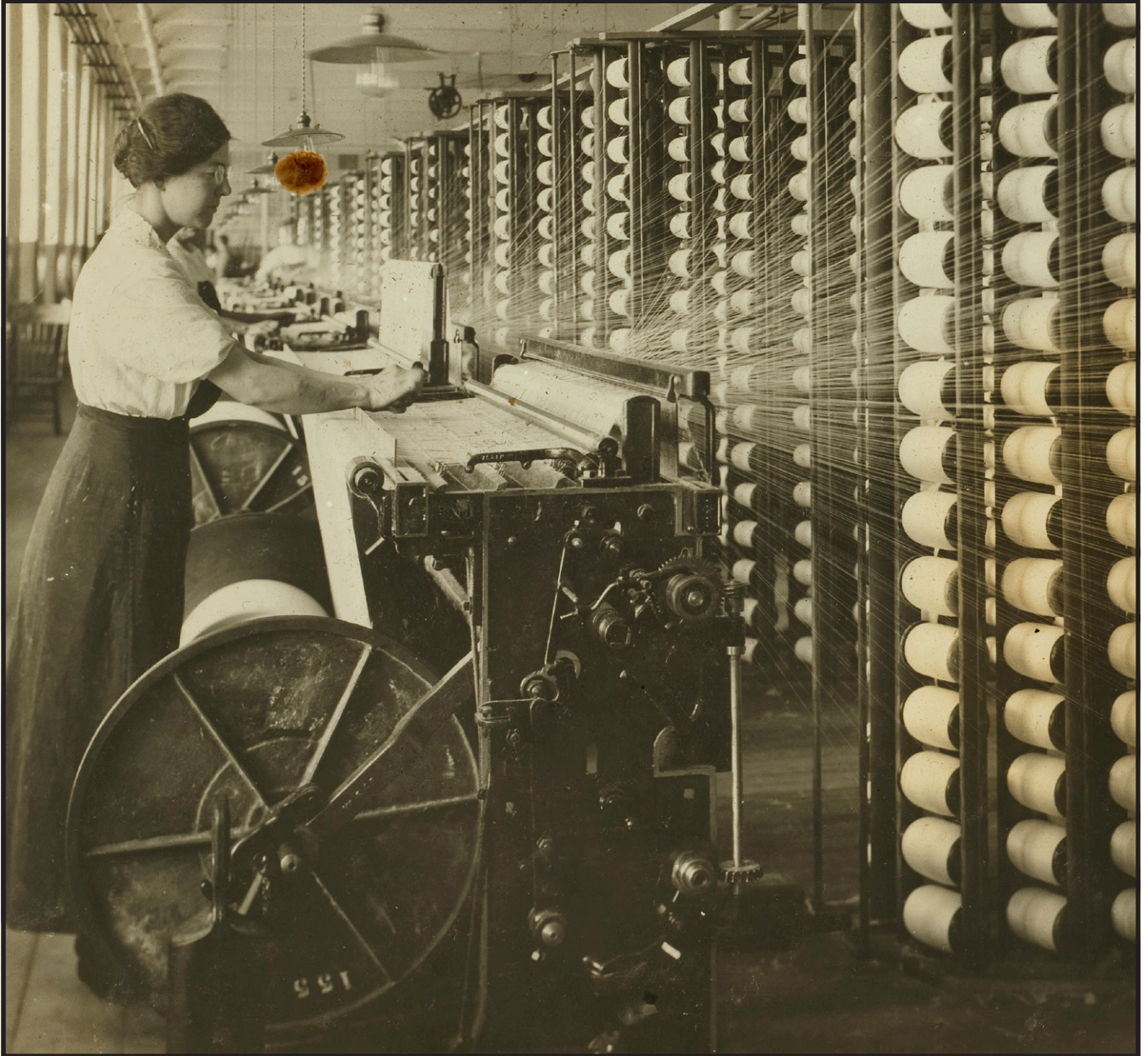
Ecosystem Services: Mitigation of Floods and Droughts

- Most rainwater is soaked up by soils and gradually distributed to plants and waterways (for example, streams, rivers, lakes).
- The roots of plants and trees hold the soil in place and shield it from the harmful effects of flooding, such as erosion.
- When the land is cleared of vegetation, rain turns soil to mud that “clogs” drainage, leading to erosion.
- Vegetation acts as a giant pump, returning water from the ground to the atmosphere.
- Erosion can damage natural and human-made waterways (for example, irrigation systems) and can disrupt nutrient cycling and dispersal.

Richard Trevithick's 1804 Locomotive



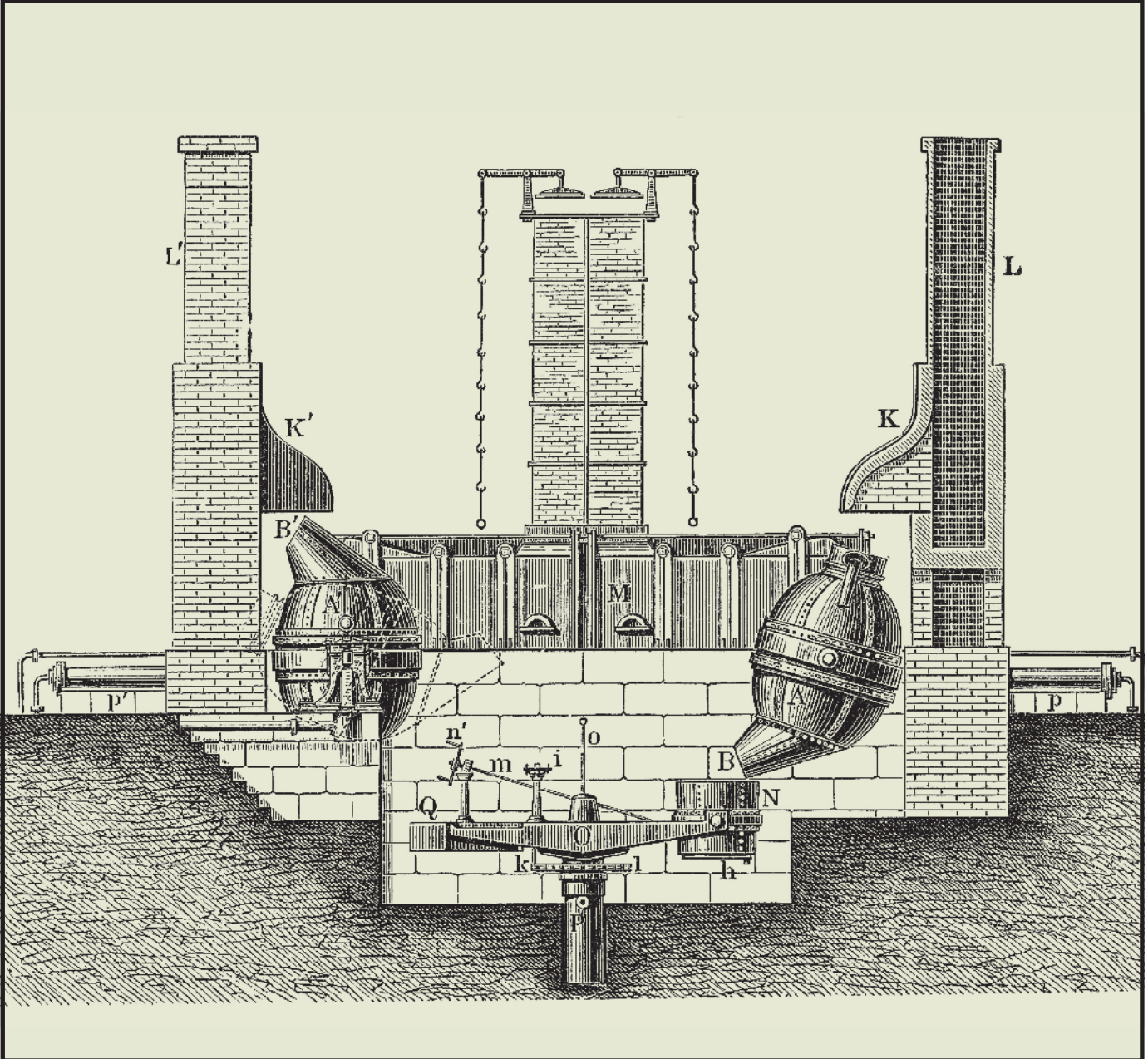
Cotton Warper



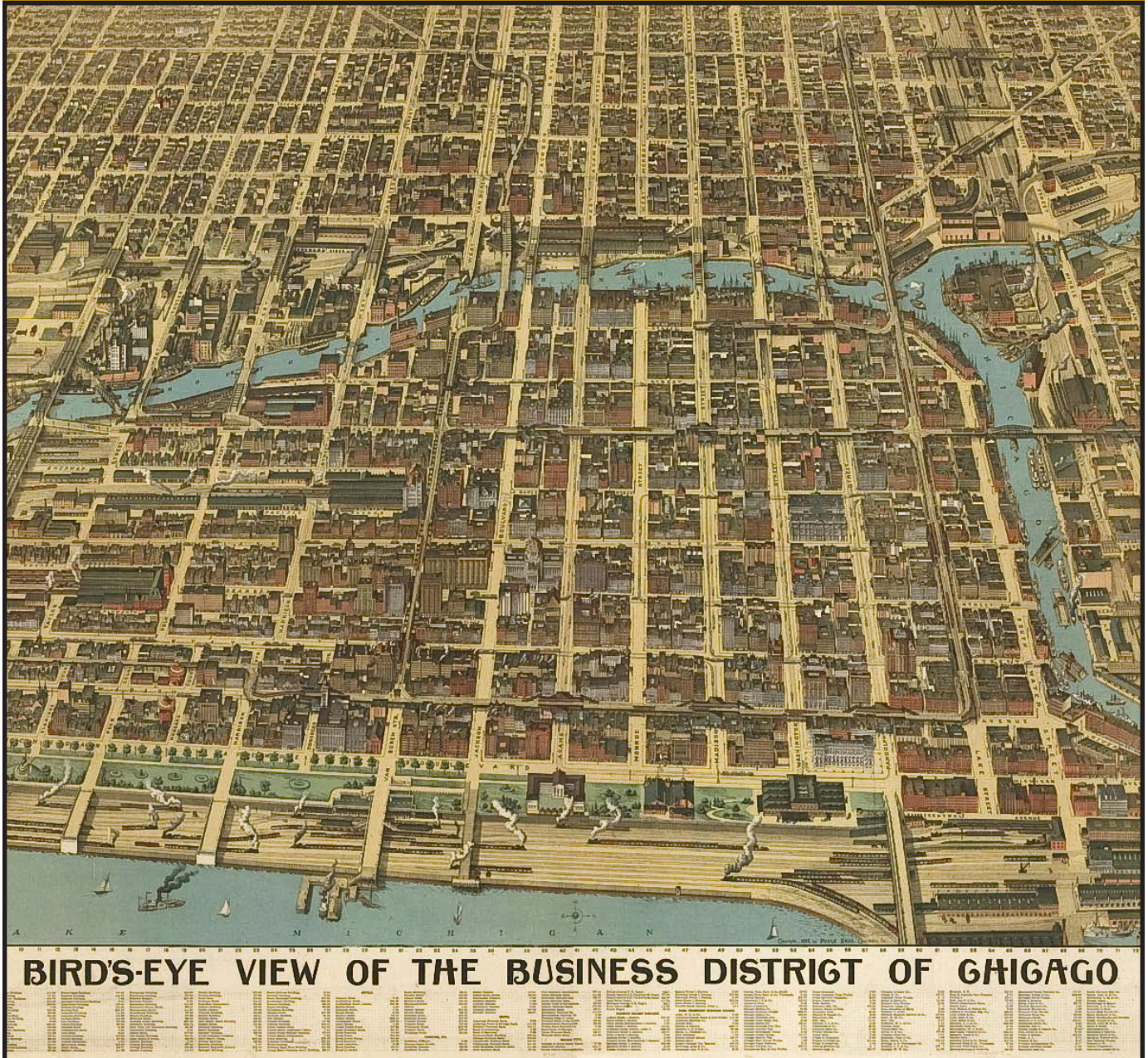
Telegraph Lines, 1891



Bessemer Process Furnace, 1898



Chicago Business District, 1898



Growing Rubber for Growing Industries

Lesson 3 Activity Master | page 1 of 5

Name: _____

Instructions: Read the information cards provided by your teacher. Respond to each of the questions below using the information provided on the associated information cards. (2 points each)

Wild Rubber in the Brazilian Amazon

1. How was rubber tapped?

2. Where were most rubber trees in South America located?

3. What is the scientific name for rubber trees (as stated in Figure 3)?

4. The layout of the Amazon rubber estate shows the extent to which landowners organized the collection of rubber in the wild. Why do you think the tear-shaped loops were called trails? What do you think was the goal of these estates?

Human Innovation and the Changing Uses of Rubber

5. What innovation changed the way rubber was used? Why?

6. How did early Mesoamericans use rubber?

Growing Rubber for Growing Industries

Lesson 3 Activity Master | page 2 of 5

Name: _____

7. What two consumer products created an increase in the demand for rubber?

8. What does a rubber tree look like?

The Automobile Industry

9. How many automobiles were produced in 1900? In 1920?

1900 = _____ 1920 = _____

10. By what percentage did the number of automobiles produced increase between 1900 and 1920?

11. For what audience might the Automobile Manufacturers Association have created this promotional material? Why?

12. How did the assembly line create an even greater desire for rubber?

Growing Rubber for Growing Industries

Lesson 3 Activity Master | page 3 of 5

Name: _____

Consumer Demand for Rubber Products

13. What technique does the first advertisement use to encourage people to buy a car?

14. When was the Keds advertisement published? What is innovative about the brand of shoes at this time?

15. What features does this advertisement promote?

16. What was the trend for consumption of natural rubber in the United States between 1890 and 1934? For what other uses besides cars and shoes might rubber have been used?

The Decline of the Amazonian Rubber Production

17. Which country in the Amazon exported the most rubber from 1890 to 1910? What happened to the number of those exports in the same time period?

Growing Rubber for Growing Industries

Lesson 3 Activity Master | page 4 of 5

Name: _____

18. What happened to the value of Amazonian rubber exports after 1910?

19. By 1920, how did the value of Amazonian rubber exports compare with the value of exports in 1865?

20. What do the numbers in Table 9 tell you about the trend in world production of rubber from 1909 to 1919?

Mass Production of Amazonian Rubber

21. What does Figure 2 indicate is the main source of world rubber after 1915?

22. How does the picture of the rubber plantation compare with your mental picture of wild rubber trees in a forest?

23. What is leaf blight?

24. After reviewing the picture of the rubber plantation, why do you think leaf blight would spread rapidly in the plantations?

Growing Rubber for Growing Industries

Lesson 3 Activity Master | page 5 of 5

Name: _____

Summary Paragraph

25. Why did the Amazon rubber “boom” go bust? (10 points)

Wild Rubber in the Brazilian Amazon

Before 1913 most of the world's natural rubber was produced in Latin America, mainly in the Brazilian Amazon. Wild rubber trees were “tapped” to extract the lucrative liquid latex material from the trees' bark.

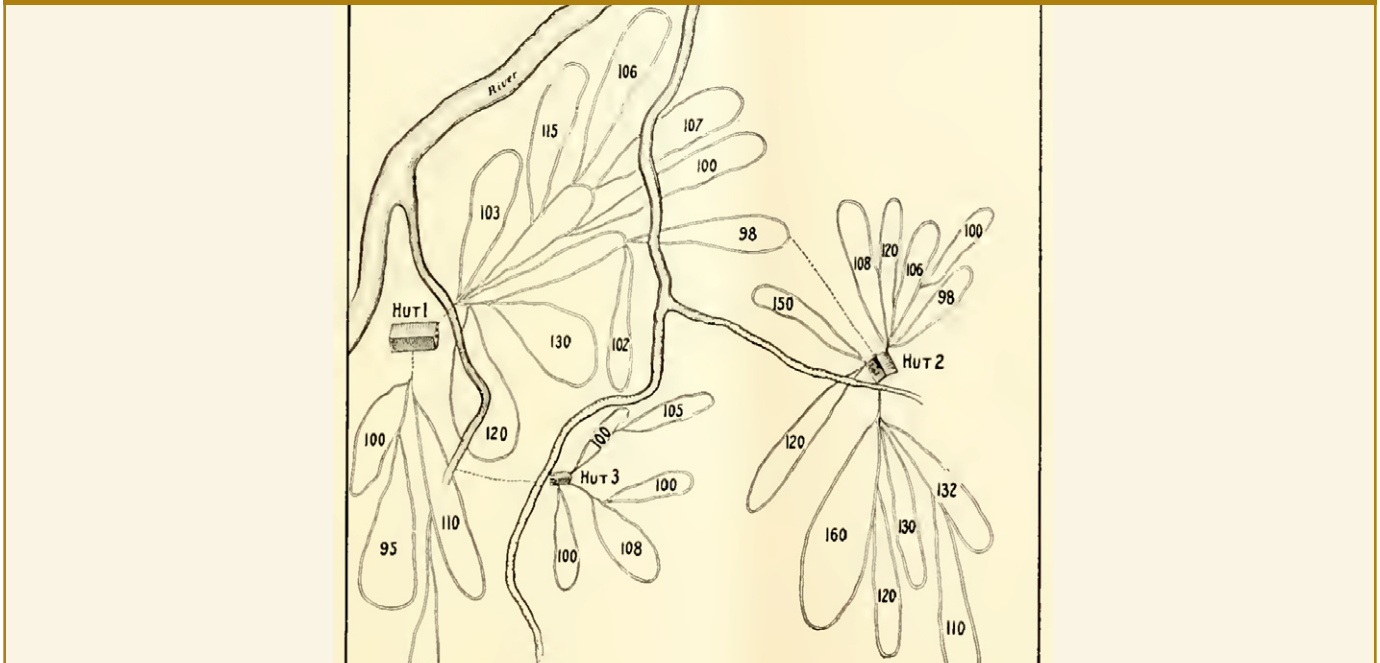


Tapped rubber tree

Rubber trees were not found in clusters or groves. Instead, they were scattered throughout the forest, often with only one rubber tree per square mile. This meant that gathering wild rubber was a slow, challenging process. It required tappers to wander the forest in search of trees and accumulate latex gradually from many different taps. Due to the rainy season, wild rubber was only gathered six months out of the year. This further limited the amount of rubber that could be harvested annually in the Brazilian Amazon.



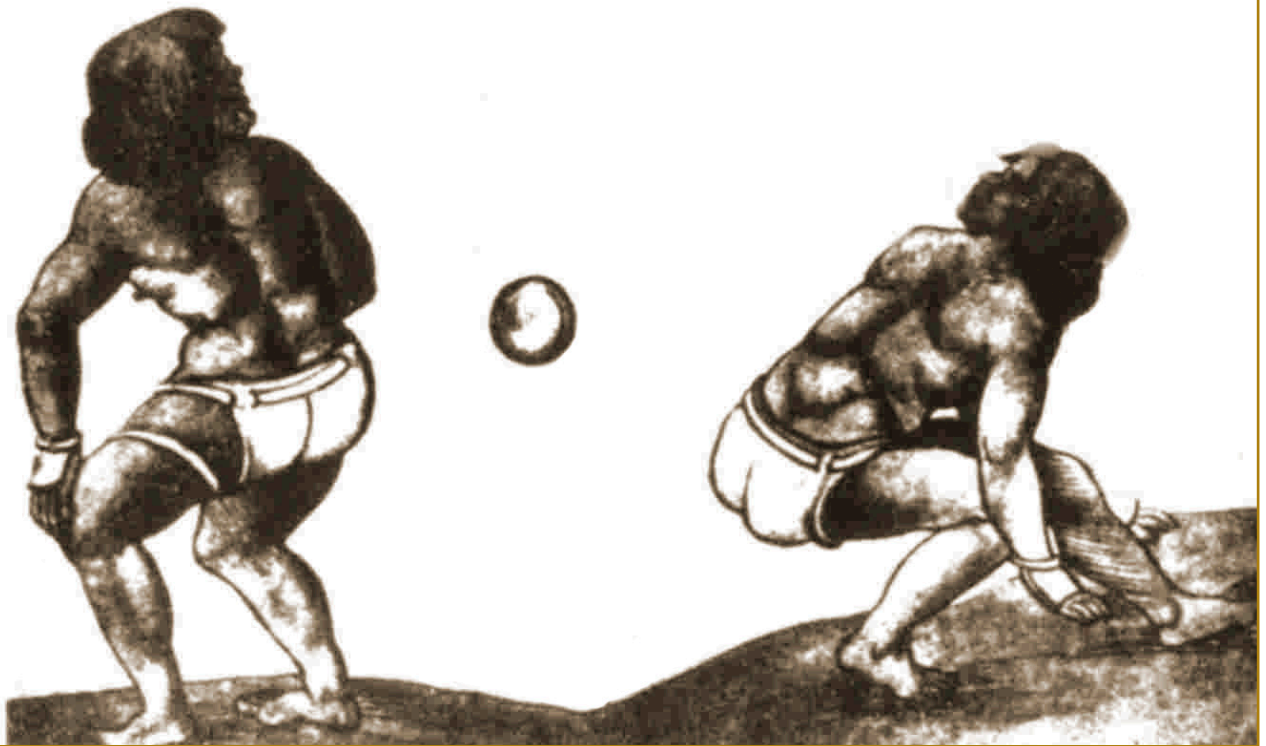
Wild rubber trees in the Amazon Basin



Wild rubber on a rubber plantation

Human Innovation and the Changing Uses of Rubber

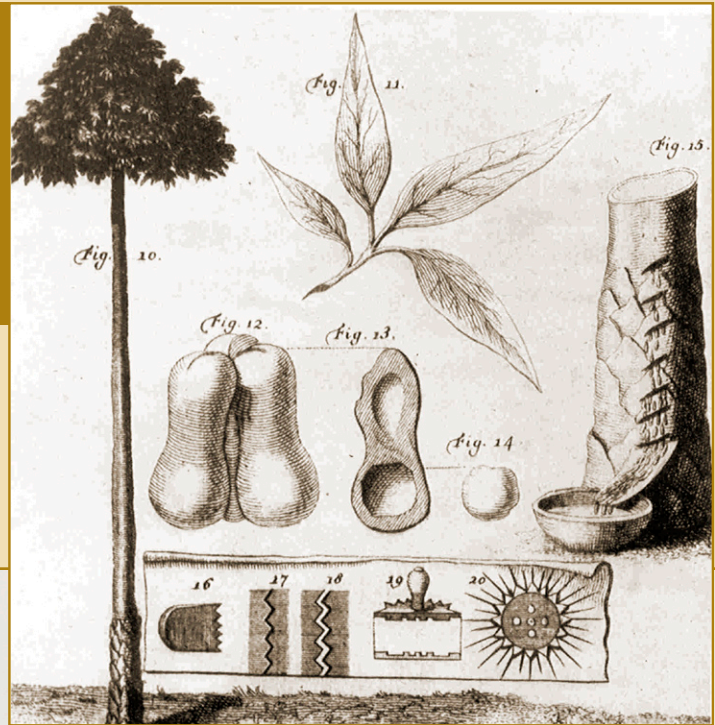
People have been using rubber for thousands of years. Mesoamericans used rubber in ceremonial ball games for more than 3,000 years. Europeans began using rubber as a waterproofing agent after Charles Marie de la Condamine's research on the Amazon basin introduced rubber's peculiar properties to the public in the 18th century.



Aztec ball game players performing for Charles V in Spain (152)

But it was the 1839 discovery of *vulcanization* by Charles Goodyear that radically changed the way rubber could be used. Before this, natural rubber was sensitive to temperature changes that altered its shape and consistency. Vulcanization made rubber resistant to extreme temperatures. This made it suitable for producing tires for bicycles and automobiles. The late 19th-century bicycle craze followed by the growth of the automobile industry after 1900 caused a worldwide “rubber boom.”

Rubber tree (*Hevea*), seeds, and tapping cuts by François Fresneau (1751)



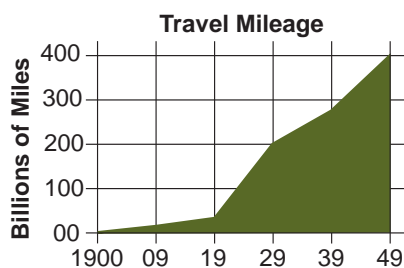
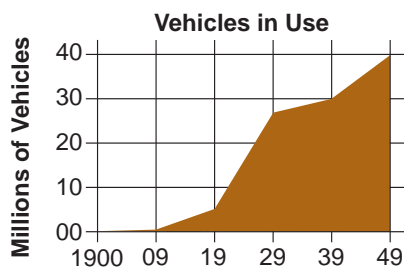
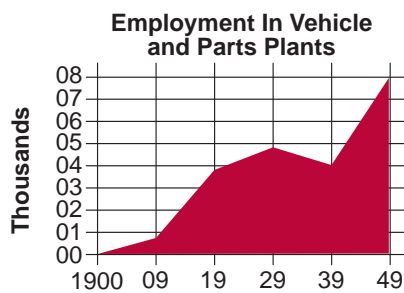
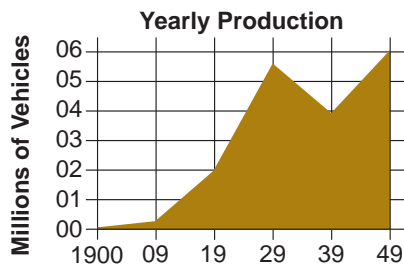
Changing a tire on a Model-T Ford (early 20th century)

The Automobile Industry

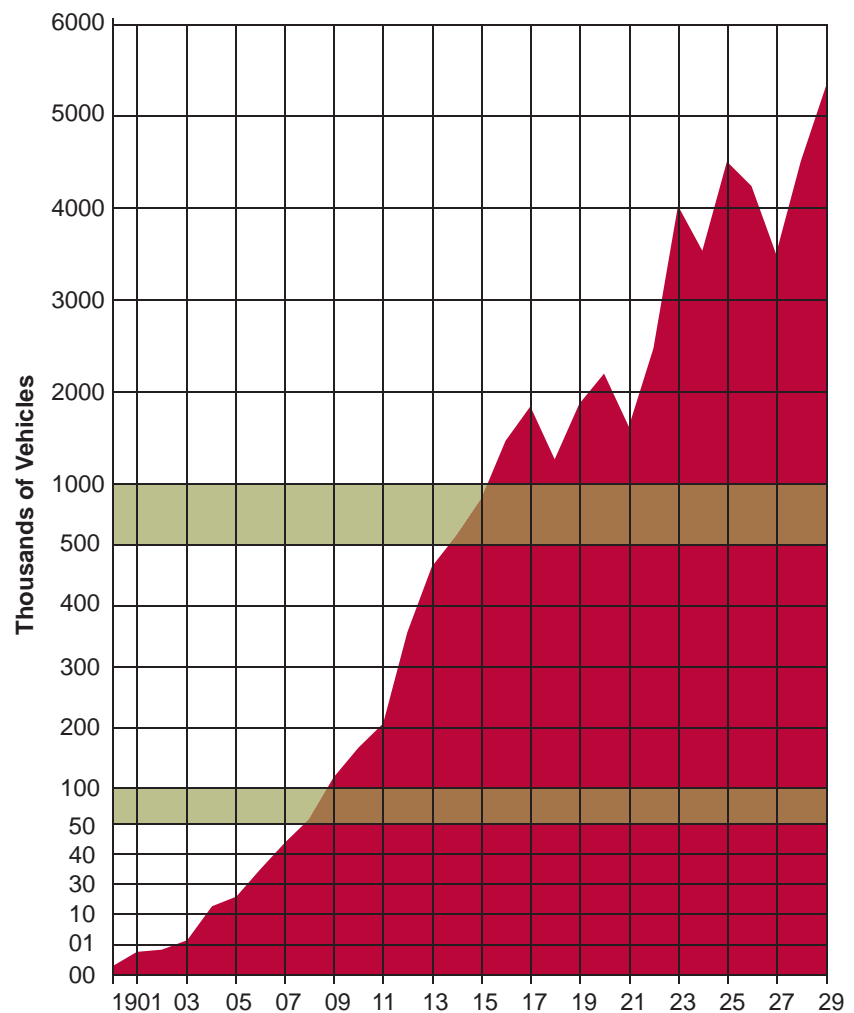


Automobile assembly line

Promotional material, Automobile Manufacturers Association

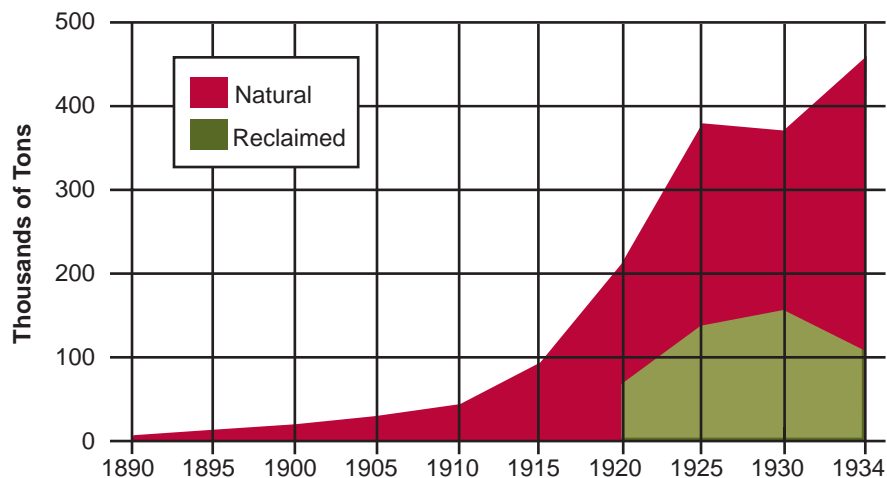
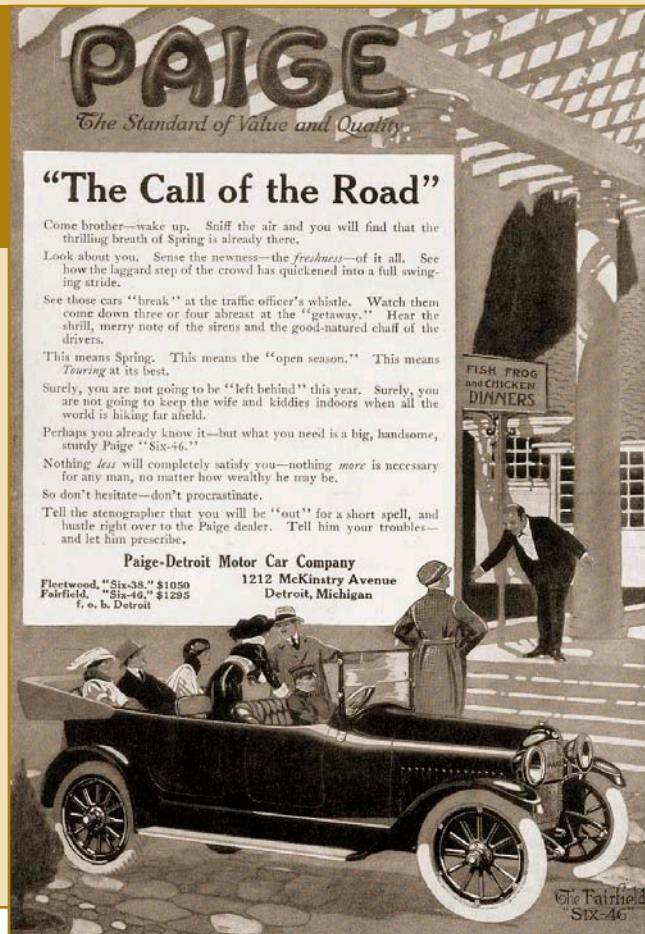


Motor vehicle factory sales, 1900 to 1929.



Consumer Demand for Rubber Products

Car advertisement, 1916



U.S. rubber consumption, 1890 to 1942

THE SATURDAY EVENING POST

39



Put Your Family in Keds

Canvas Rubber-soled Footwear for Men, Women and Children

KEDS is the name to guide you to grace, beauty and solid comfort in footwear. Keds is the new name of an old-established family of ultra-stylish, serviceable and comfortable rubber-soled shoes with uppers of a specially woven fine grade of canvas.

If you glory in a light, springy step, full of noiseless grace, ask your dealer for Keds. There are many styles and shapes. You can find your particular Keds, whether for the fashionable boulevard or afternoon tea on your own porch.



\$1.50
up



\$1.25
to
\$2.00



\$1.00
to
\$1.50

There is style in Keds. They are built on popular lasts and approved by fashion authorities.

There is comfort in Keds. The tops offer full, elastic support; the soles are durable, flexible and buoyant.

Keds are vogue—they are worn by particular dressers at all the smart places—they add a refreshing grace to the dainty feet of society women—they give substantial wear with good looks and solid comfort to business men—for children they are next to going “barefoot.”

There are three grades of Keds. Choose the kind you want. You are sure of wear in every pair. Each grade carries with it the reputation of the largest rubber manufacturer in the world.

There is economy in Keds. Cost considered, Keds outwear any other footwear yet devised.

Ask your dealer to show you Keds and shoe the family in style and comfort.

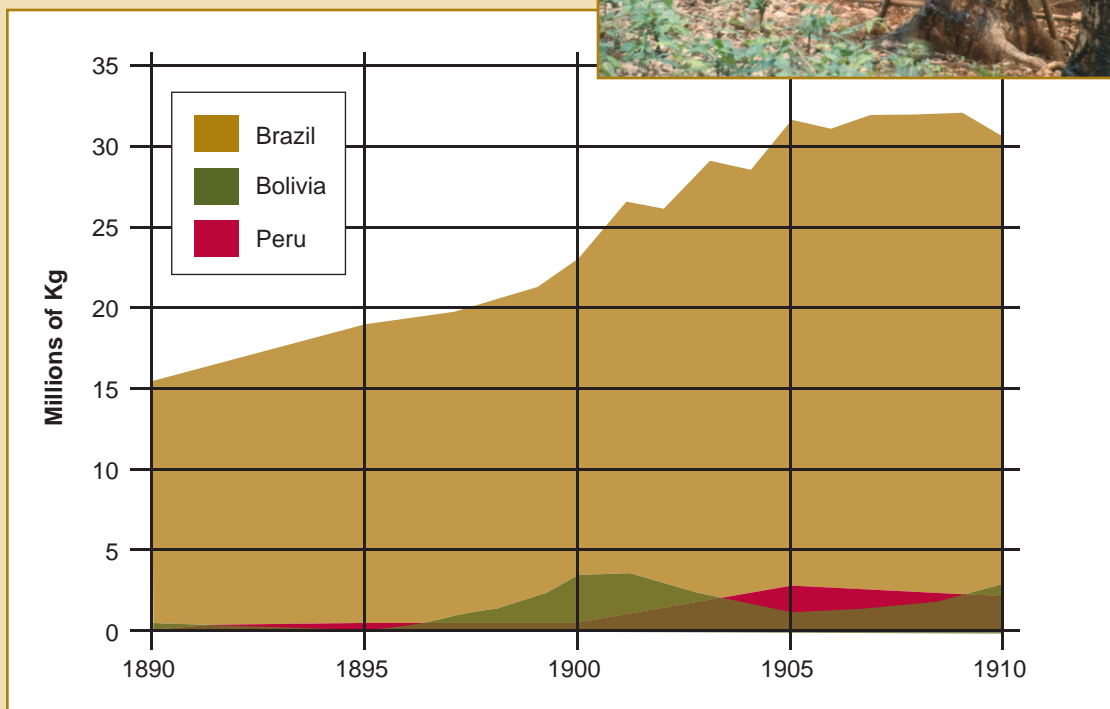
United States Rubber Company

New York

Keds shoe advertisement, 1917

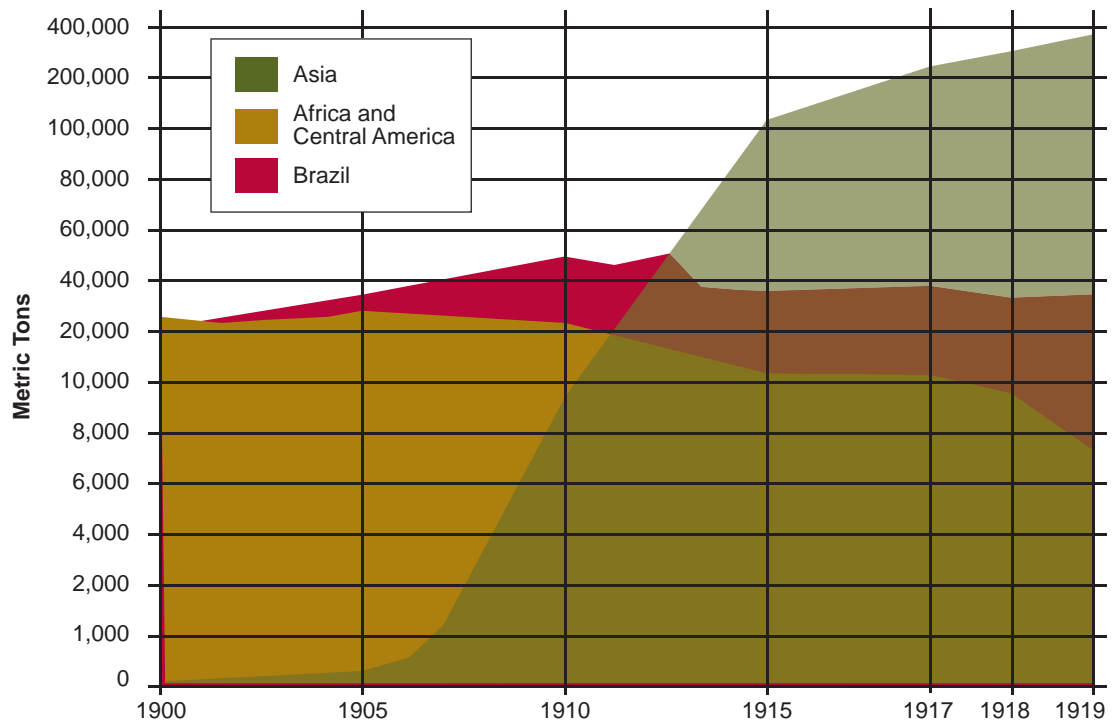
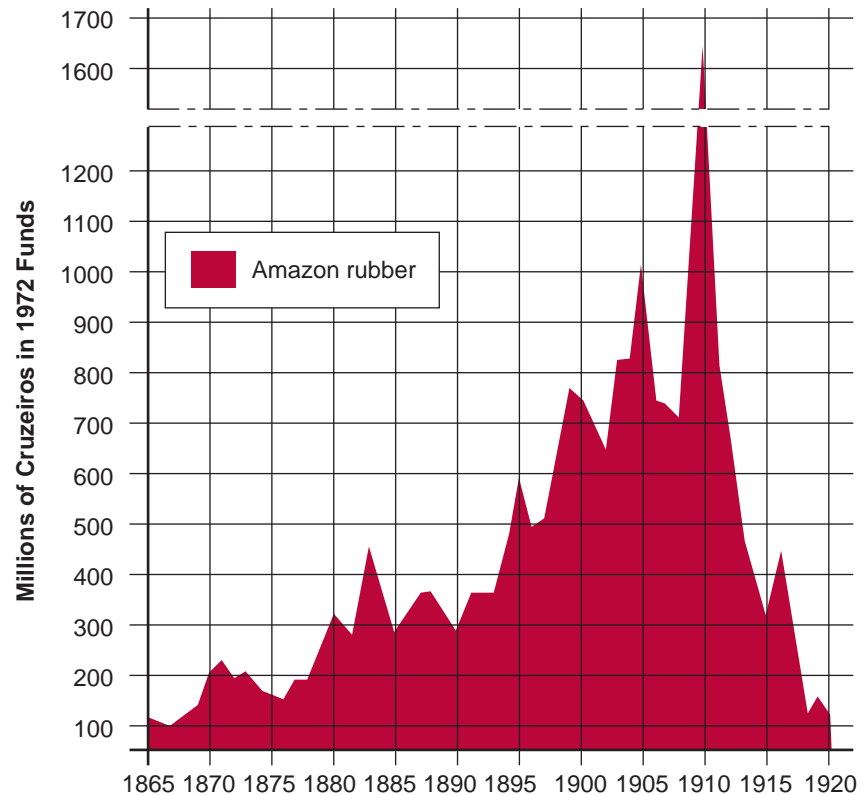
The Decline of Amazonian Wild Rubber Production

The high price of Amazonian rubber prompted the search for alternatives sources of rubber outside of South America. British scientist Henry Wickham smuggled 70,000 rubber seeds out of the Brazilian Amazon in 1876. By 1895, rubber plantations in British colonies in Southeast Asia were quickly becoming a reliable source for large quantities of rubber grown on plantations.



Wild rubber exports during the Amazonian rubber boom, 1890 to 1910

Value of Amazonian rubber export, 1865 to 1920



World production of rubber, 1900 to 1919

Plantation Rubber in the Amazon Basin

Rubber plantations in Southeast Asia increased rubber production by planting many trees close together. Having the trees close together also made harvesting the latex easier. These changes in rubber production reduced the cost of rubber to industrial manufacturers. Southeast Asia became the leading provider of rubber to the world.

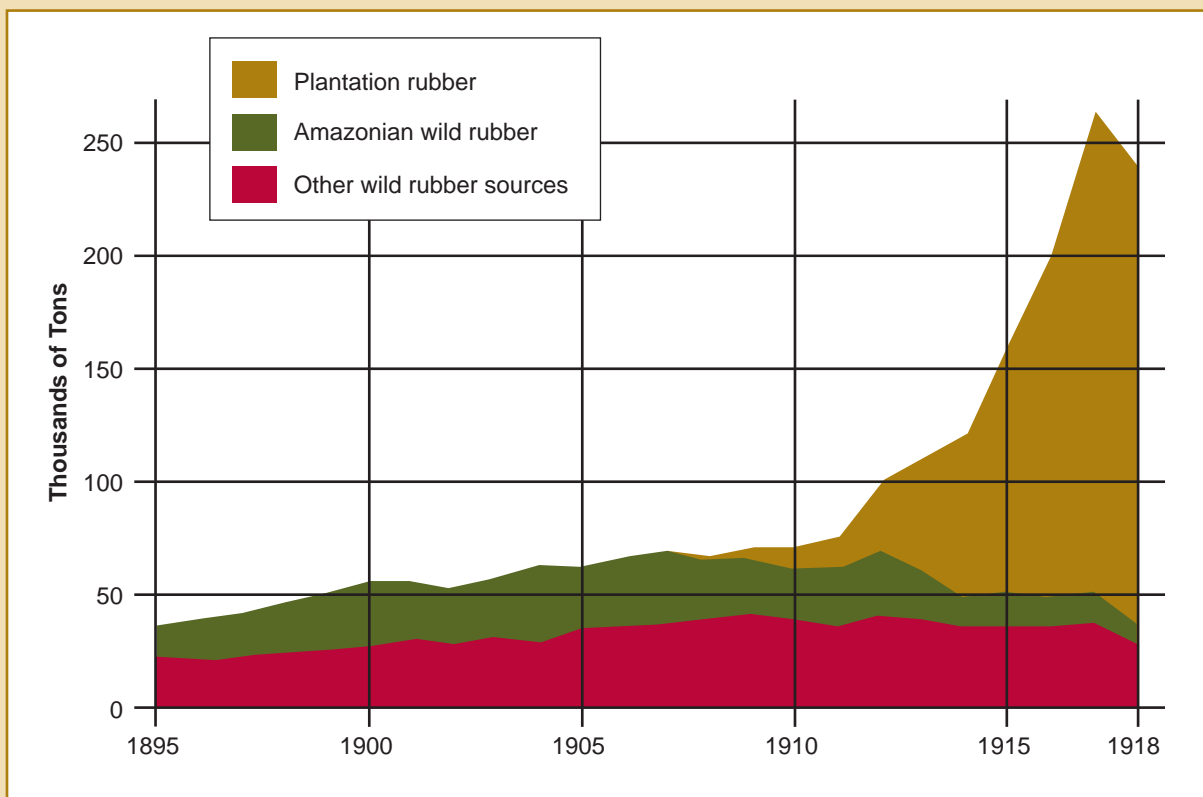
Finally, Southeast Asian rubber was disease resistant. Brazilian plantations, in contrast, were subject to a local plant disease called South American leaf blight. Leaf blight didn't affect wild rubber trees because the trees were scattered throughout the forest. This meant pathogens—the microorganisms that cause disease—could not “travel” from tree to tree. However, because trees on plantations were planted close together, this natural barrier to disease was removed. This doomed Amazonian plantations to failure. Leaf blight did not affect Southeast Asian plantations, though, because colonial officials were successful in keeping the deadly South American plant fungus away from those plantations.



Leaf blight



Rubber plantation



Plantation vs. wild rubber production worldwide, 1895 to 1918.

Concept Definition Map

Lesson 4 Activity Master

Name: _____

Concept Definition Map

National Security	Strategic Advantage	National Hegemony	Social Darwinism	Missionary Impulse
↓	↓	↓	↓	↓
What does it look like?	What does it look like?	What does it look like?	What does it look like?	What does it look like?
<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
↓	↓	↓	↓	↓
Primary Goals	Primary Goals	Primary Goals	Primary Goals	Primary Goals
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↓	↓	↓	↓	↓
Definition	Definition	Definition	Definition	Definition
<div></div>	<div></div>	<div></div>	<div></div>	<div></div>

Primary Source Analysis Form

Lesson 4 Activity Master | page 1 of 2

Name: _____

Source Document: _____

As you read, answer the following questions:

1. Who is the author? What do you know about the author? (2 points)

2. When was this document published? (2 points)

3. For what purpose was the document written? How might that affect the message? (2 points)

4. What is the main idea of the document? What is the author arguing? (2 points)

5. What is the document saying about the control and use of natural resources? (2 points)

Primary Source Analysis Form

Name: _____

Now choose some especially poignant quotes that best represent the author's opinion regarding the following:

- national security and strategic advantage (political matters)
- moral issues raised by the search for national hegemony, Social Darwinism, and the missionary impulse (social matters)
- material issues such as land, resources, and technology (economic matters)

You may or may not find relevant quotes for each item listed above. Write your quotes in the space designated around the classroom. Be prepared to discuss your quotes with the class. (5 points)

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

John G. Paton 1883

For the following reasons we think the British government ought now to take possession of the New Hebrides group of the South Sea islands, of the Solomon group, and of all the intervening chain of islands from Fiji to New Guinea:

1. Because she has already taken possession of Fiji in the east, and we hope it will soon be known authoritatively that she has taken possession of New Guinea at the northwest, adjoining her Australian possessions, and the islands between complete this chain of islands lying along the Australian coast.
2. The sympathy of the New Hebrides natives are all with Great Britain, hence they long for British protection, while they fear and hate the French, who appear eager to annex the group, because they have seen the way the French have treated the native races in New Caledonia, the Loyalty Islands, and other South Sea islands...
6. The islands on this group are generally very rich in soil and in tropical products so that if a possession of Great Britain, and if the labor traffic stopped so as to retain what remains of the native populations on them, they would soon, and for ages to come, become rich sources of tropical wealth to these colonies, as sugar cane is extensively cultivated on them by every native of the group, even in his heathen state... The islands also grow corn, cotton, coffee, arrowroot, and spices, etc., and all tropical products could be largely produced on them.
7. Because if any other nation takes possession of them, their excellent and spacious harbors, as on Efate, so well-supplied with the best fresh water, and their near-proximity to Great Britain's Australasian colonies, would in time of war make them dangerous to British interests and commerce in the South Seas and her colonies.
8. The thirteen islands of this group on which life and property are now comparatively safe, the 8000 professed Christians on the group, and all the churches formed from among them are, by God's blessing, the fruits of the labors of British missionaries, who, at great toil, expense, and loss of life have translated, got printed, and taught the natives to read the Bible in part or in whole in nine different languages of this group, while 70,000 at least are longing and ready for the gospel. On this group twenty-one members of the mission families died or were murdered by the savages in beginning God's work among them, not including good Bishop Peterson, of the Melanesian mission, and we fear all this good work would be lost if the New Hebrides fall into other than British hands.



New Hebrides men and boys

Source: Letter Published by John G. Paton, New Hebrides Mission, 1883 *Accounts and Papers 1883*, (London: HMSO, 1883), Vol. XLVII, pp. 29–30.

Paul Leroy-Beaulieu 1891

The great value of colonies...is not only that they serve to catch the overflow population of the mother country, nor even that they open a particularly reliable area of investment for excess capital, it is also that they give a sharp stimulus to the commerce of the country, that they strengthen and support its industry and furnish to its inhabitants—industrialists, workers, consumers—a growth of profits, of wages, or of interest).

But...these advantages resulting from the prosperity of the colonies, are not limited just to the mother countries; they extend to all the countries of the old world [i.e., Europe] and in fact there is not a nation which does not derive a real benefit from this increase in the productivity of humanity... Imperialism has caused the opening of new sources of production... It is thus that unknown products have been brought to the consumers of Europe to increase their comfort. ...That is the first and incontestable result of imperialism. And this is the second: It is to open the new markets for the sale of products manufactured in Europe, markets more profitable and more expandable than those we have been limited to previously, because the new societies have an ability to grow and to create and accumulate riches infinitely greater than the old societies. Thus trade is stimulated and extended, the division of labour is augmented; industry having before it wider openings can and must produce more and such production on a greater scale calls for new improvements and new advances...

The advantages of which we have been speaking so far are general and apply not only to the mother countries, but to all the civilized countries, even those without colonies. ...[But] it appears to us incontestable that the home countries gain a special advantage from their own colonies: first, it is the capital of the citizens of the mother country which is sent there, and in this more productive field it is assured of higher interest, which improves

the fortunes of the investors, of which a good number without doubt remain in the mother country. Further, the community of language, habits, and traditions, gives an advantage to the home country over all foreign nations even in free trade with the colonies. The colonists retain for a long time the tastes of the mother country... [and] their relations with her have a degree of intimacy which she rarely has with other nations ... It is extremely rare that a colony furnishes a net revenue to the mother country: in infancy it is not able, in maturity it does not want to...

Source: S. Pollard et al., *Documents of European Economic History*, Vol. 2, pp.165–7



French market

Sir F. Lugard

...Beyond doubt the development of resources of the tropics and the relations of its peoples to European civilisation will form the greatest problem of the twentieth century. Its products are becoming more and more indispensable to the white races, forming as they do the raw material for our most important industries. In the commercial and industrial competition which is becoming ever more acute between the civilised races it becomes more essential to safeguard and to organize our sources of supply...

...Unconcerned with the bulk of the questions which form the "domestic policy" of the countries of the temperate zones, or even with those connected with *colonisation* (properly so called), it is concerned exclusively with (a) the proper control of vast populations who are centuries behind the white races in mental evolution. (Though in some rare instances these may be capable to some degree of self-government, and in others may be governed by alien races domiciled for centuries among them, the guiding and governing impulse must be created by the white races if Africa is to emerge from the apathy and stagnation of centuries.) This is the internal or administrative problem; (b) the external problem is purely commercial. Since these countries are not suited for colonisation by white races their value to us depends on their products. Chambers of Commerce are composed of men who though they trade with Africa have themselves never lived there, and who depend for their information chiefly on their employees, who are mostly recruited from an uneducated class. They are apt to lay down theories often contradictory and sometimes prompted chiefly by a study of immediate profit and loss. The economic development should be based on well-considered schemes, fully discussed with scientific experts after careful examination of all experiments made in the tropical possessions of other Powers, and not merely on the views of local trading houses. It should be guided by foresight and continuity of policy, ready at all times to hear

the views and accept useful suggestions from men of business, and to explain to them the motive and object of each new departure. The object in my view therefore of a tropical and economic development department would be to provide the Secretary of State with expert advice on both sides of the question, to meet the arguments of missionaries and philanthropists on the one hand and of commercial firms on the other, leaving the Secretary of State as arbiter.

Source: Letter from Sir F. Lugard



British soldiers in Africa

David Livingstone 1858

As far as I am myself concerned, the opening of the new central country is a matter for congratulation only in so far as it opens up a prospect for the elevation of the inhabitants. As I have elsewhere remarked, I view the end of the geographical feat as the beginning of the missionary enterprise.

I take the latter term in its most extended signification, and include every effort made for the amelioration of our race, the promotion of all those means by which God in His providence is working, and bringing all His dealings with man to a glorious consummation. Each man in his sphere, either knowingly or unwittingly, is performing the will of our Father in heaven. Men of science, searching after hidden truths, which, when discovered, will, like the electric telegraph, bind men more closely together—soldiers battling for the right against tyranny—sailors rescuing the victims of oppression from the grasp of heartless men-stealers—merchants teaching the nations lesson of mutual dependence—and many others, as well as missionaries, all work in the same direction, and all efforts are overruled for one glorious end...



Picking cotton

...Their country is well adapted for cotton; and I venture to entertain the hope that by distributing seeds of better kinds than that which is found indigenous, and stimulating the natives to cultivate it by affording them the certainty of a market for all

they may produce, we may engender a feeling of mutual dependence between them and ourselves. I have a twofold object in view, and believe that, by guiding our missionary labors so as to benefit our own country, we shall thereby more effectually and permanently benefit the heathen...

We ought to encourage the Africans to cultivate for our markets, as the most effectual means, next to the Gospel, of their elevation.

It is in the hope of working out this idea that I propose the formation of stations on the Zambesi beyond the Portuguese territory, but having communication through them with the coast.

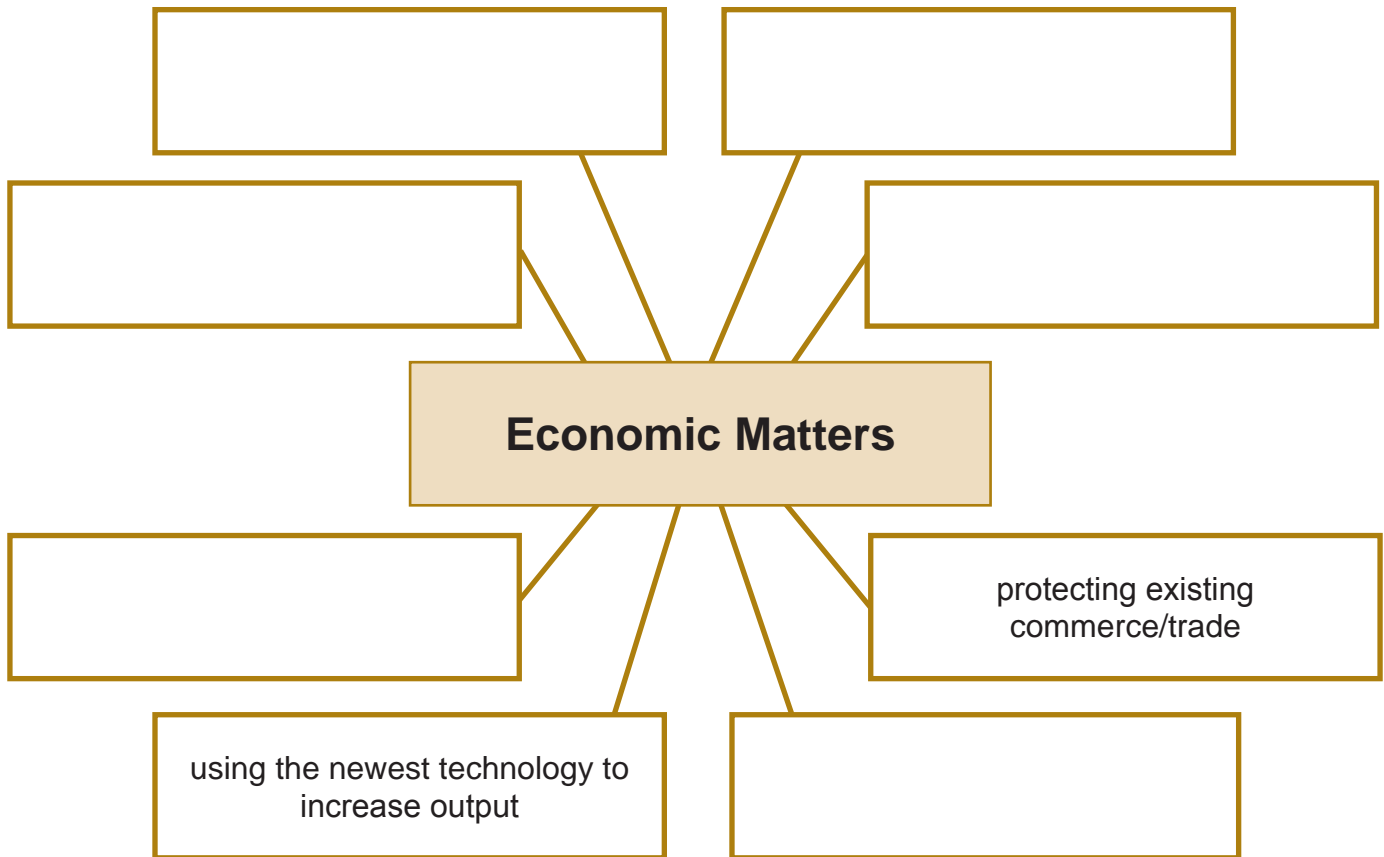
Source: David Livingstone in "Missionary Travels and Researches in South Africa," 1858

Differing Opinions: The Control and Use of Natural Resources

Lesson 4 Activity Master | page 1 of 2

Name: _____

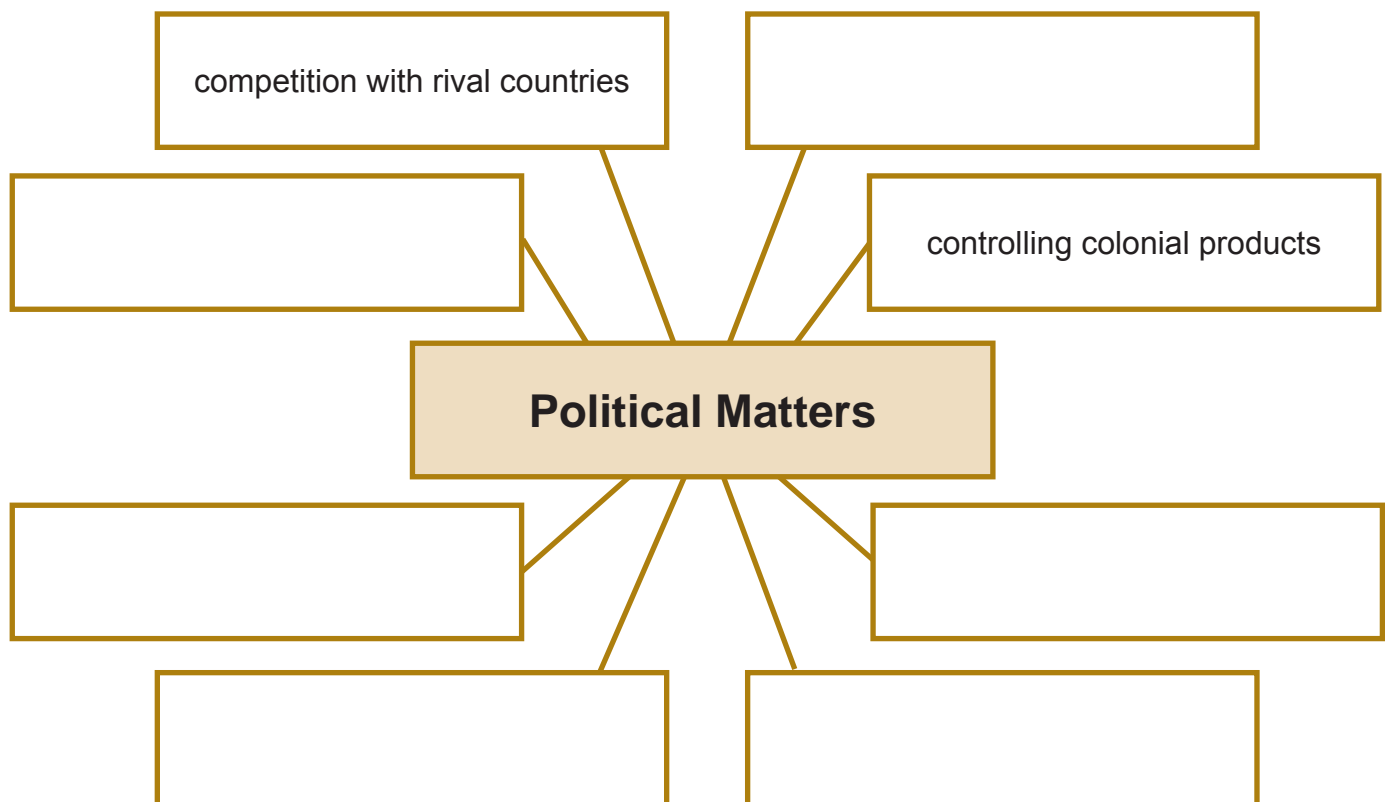
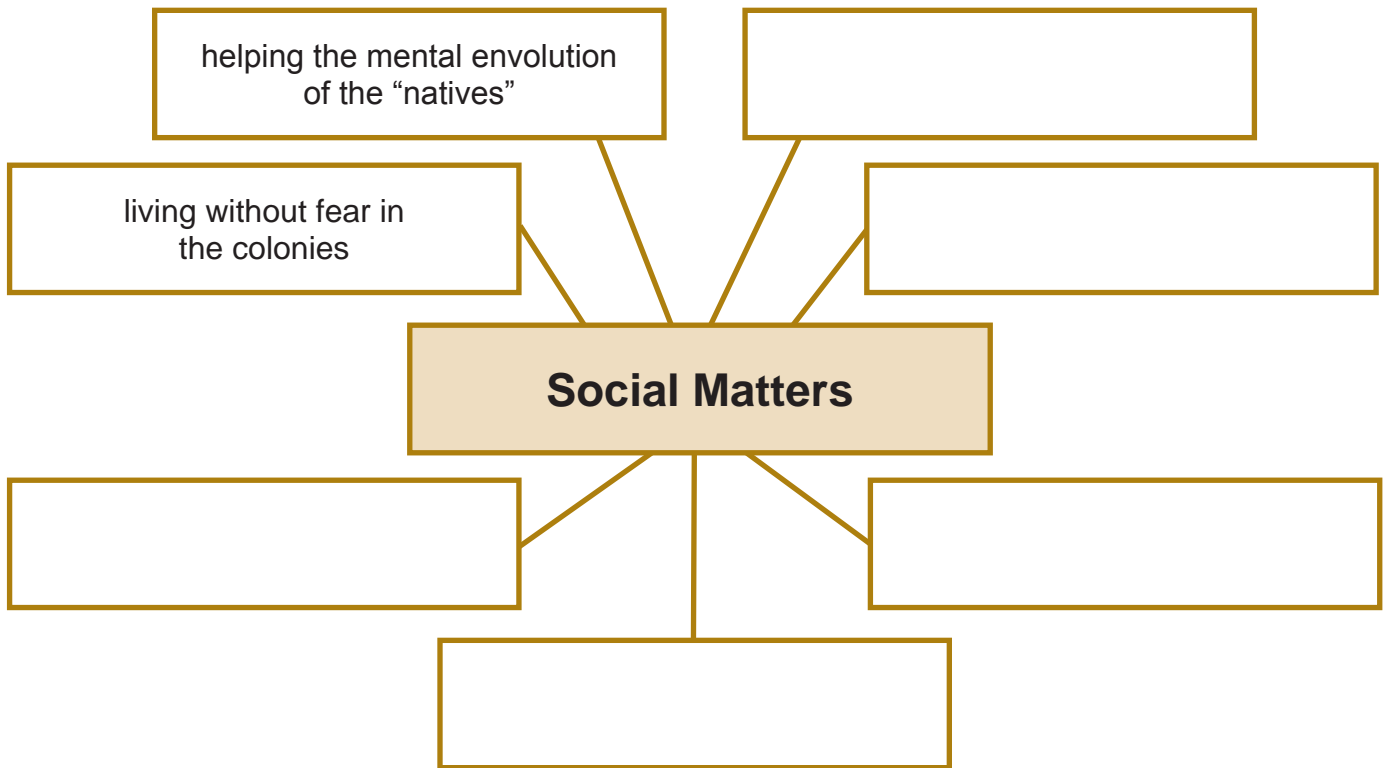
Instructions: Use the quotes generated by the class during the group activity to summarize the essential concerns of imperial leaders about the control and use of natural resources in the colonies. Each web diagram has been started for you. Fill in the remaining shapes. (5 points per web)



Differing Opinions: The Control and Use of Natural Resources

Lesson 4 Activity Master | page 2 of 2

Name: _____




Concept Definition Map

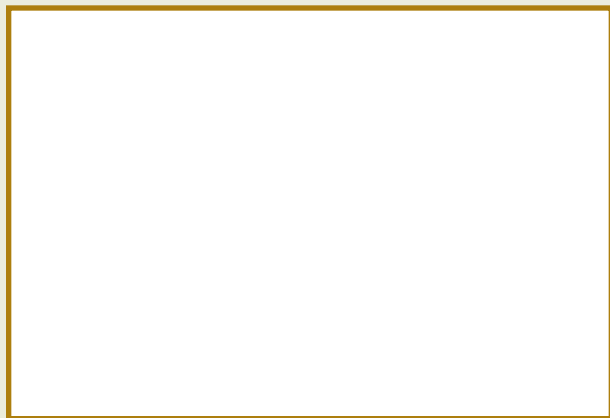
Concept



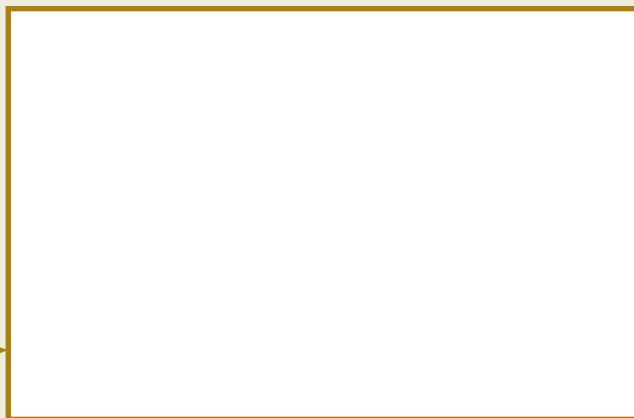
What does it look like?



What are its primary goals?



Definition



Conservation in British India

Lesson 5 Activity Master | page 1 of 2

Name: _____

Instructions: Read the passages below taken directly from the book *Forestry in British India* by the Inspector-General of Forests in India, Berthold Ribbentrop, written in 1900.

Respond to the questions below. (3 points each)

In 1865 the first Indian Forest Act was passed ...

It became evident that in order to effect the changes required, it was necessary to legislate in order to legalise the settlement and reservation of forest areas ...

The Forest Act provides for the constitution [forming] of Reserved forests and Protected forests.

That the wholesale destruction of forests has had the most deteriorating effect on the climate of India is certain ... There can be no doubt, whatever may be said to the contrary, that forests tend to increase the rainfall, and that in a warm-climate the denudation of a country diminishes its rainfall and consequently its fertility, is correct ... The ground was subsequently cleared for potato fields, and some fine crops of excellent potato crops were gathered. Now, however, the soil has been washed down into the ravines, the fields have to a great extent disappeared, and the barren hillside is cut up by the dry stony beds of Alpine torrents ...

... the withdrawal of man's active interference would, under favourable circumstances, be sufficient in time to re-clothe the now denuded areas with forest vegetation ...

Railways spread and forest growth disappeared with an incredible rapidity within the lines, partly on the account of the direct demands for them for constructive works and fuel ...

... with the advance of modern civilization, the demands both of the trade and of the population increased, whereas the forests diminished in size.

1. What time period is being discussed?

2. What natural resource needs conservation?

3. What laws or policies previously provided environmental protection?

Conservation in British India

Lesson 5 Activity Master | *page 2 of 2*

Name: _____

4. What was the effect of natural resource overuse on the environment?

5. What is the proposed solution?

6. What influence did the Industrial Revolution and imperialism have on the environment?

7. What spurred conservation efforts?

Name: _____

Instructions: Read the passages below taken from the article you read during Lesson 1, *California Connections: Paving the Way for a Cleaner Tomorrow*.

Respond to the questions below. (3 points each)

The rapid industrialization of the last century, however, has created a surplus of carbon dioxide and other gases.

Federal and state laws regulate the emission of greenhouse gases ...

Drilling, transporting, and refining oil contributes to air pollution, and can alter and contaminate ecosystems. Burning fossil fuels for energy creates greenhouse gases, such as carbon dioxide.

The confluence of political, geological, and environmental pressures has made the search for fossil fuel alternatives a national imperative.

Government and industry have invested billions of dollars over the last few decades to find an alternative fuel that is practical, sustainable, and clean.

In 2004, California took the lead again by creating the California Hydrogen Highway Network (CaH₂Net).

Much of our nation's oil supply comes from politically unstable regions. Some experts believe the world's oil reserves will be depleted within our lifetime. In addition, the remaining oil is getting more and more difficult to extract.

1. What time period is being discussed?

2. What natural resource needs conservation?

Name: _____

3. What laws or policies previously provided environmental protection?

4. What was the effect of natural resource overuse on the environment?

5. What is being done by government and industry?

6. What influence did the Industrial Revolution and imperialism have on the environment?

7. What spurred conservation efforts?

Comparing Conservation in British India and Contemporary California

Lesson 5 Activity Master

Name: _____

Comparing Conservation in British India and Contemporary California

British India differences:

Similarities:

Contemporary California differences:

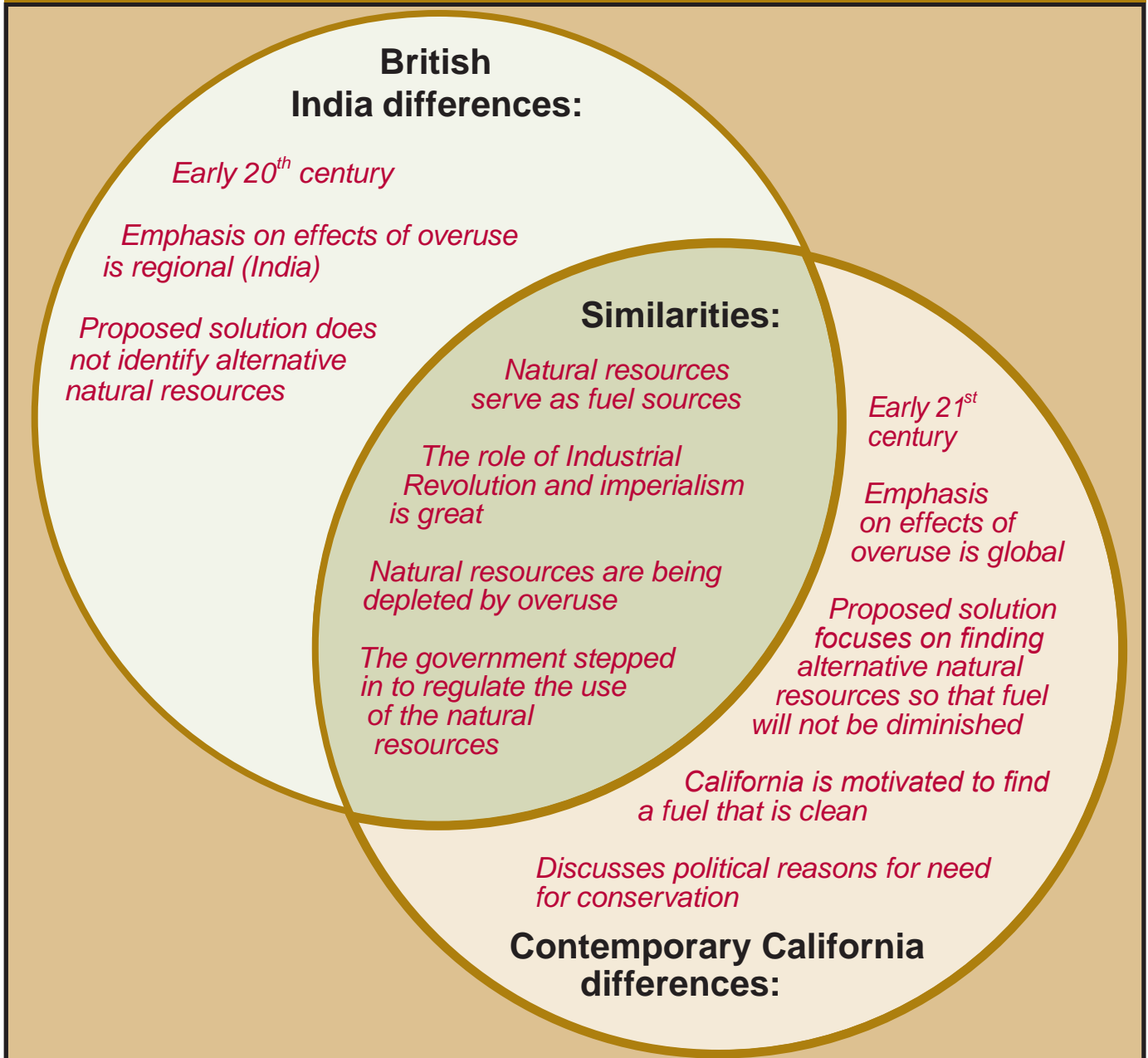
Conservation Efforts in British India—Warm Up

Our earlier administrators, occupied with the building up of an Empire, probably never thought of the important part that forests have always played, play now, and will for ever play in the household of nature, or of the immense influence they exercise on the physical well-being of a country.

—Berthold Ribbentrop, Inspector-General of Forests in India

1. What does Ribbentrop mean by calling forests part of the “household of nature?”
2. What is conservation?
3. According to Ribbentrop, why did early imperial administrators probably not practice conservation?
4. What circumstances probably led Ribbentrop to make the above statement?

Comparing Conservation in British India and Contemporary California



Conservation Efforts in British India—Closing

Although not all humans recognized the value of conservation at the beginning of the 20th century, Ribbentrop's writings indicate that people were starting to question the relationship between humans and the environment.

Did it surprise you to learn that the conservation movement began more than 100 years ago? Why or why not?

What do you think accounts for the differences in efforts to conserve natural resources in British India and Contemporary California?

Why is it important that the government create laws and policies to encourage conservation?

Malaria

Malaria is a disease caused by one of four species of a **parasite** called *Plasmodia*. It occurs mostly in tropical areas but can occur anywhere mosquitoes thrive. The disease spreads quickly when mosquitoes bite a person who has already been infected. Below is a description of the way in which mosquitoes transmit malaria:

1. Infected human is bitten by a mosquito.
2. *Plasmodia* travel to the mosquito.
3. *Plasmodia* multiply in the mosquito.
4. The mosquito bites a healthy human.
5. *Plasmodia* enters the bloodstream of a healthy human and causes infected red blood cells to burst; the healthy human now has malaria.
6. The mosquito continues to bite other healthy humans.

Symptoms include fever, chills, headache, and nausea. Every time a new set of infected red blood cells burst, these symptoms can occur. Some people are afflicted with malaria for years.

No one knows exactly when the parasites that cause malaria first started to spread, but they have been around for thousands of years. Alexander the Great may have contracted malaria back in the fourth century B.C.E. Chinggis [Genghis] Khan is said to have battled malaria at the same time that he fought infection from battle wounds in the 13th century.

In the 17th and 18th centuries, Europeans risked getting sick when they explored the tropical areas of Asia, Africa, and the Americas. Few Europeans traveled to the interior of Africa. In fact, it was known as “the white man’s grave.” When he finished the first overseas survey of British troops in 1840, Major Alexander Tulloch discovered that approximately 25% of visitors died of disease in Sierra Leone during the early 19th century. Areas outside of West Africa had lower death rates, but disease was always a threat. Europeans knew about the many natural resources in the interior of Africa, but few wanted to risk death to get them.

Directions: Label the continents on which malaria occurs as indicated by the shaded areas on the map on **Quinine and the Global Implication of Imperialism**.

Glossary

Botanical gardens:

Gardens that are used to collect, grow, and study plants from around the world.

Herbalist: A person who grows and collects herbs, and possibly even treats patients with herbs.

Monopoly: Sole control over a natural resource, good, or service.

Parasite: An organism that lives on or in a host organism and can only survive through the nutrients of the host.

Quinine

Rewind to 1638 when a Spanish friar and **herbalist** living in Peru wrote about a tree whose bark helped cure severe fevers in Lima. This tree was called a *Cinchona* tree. At first, the Jesuit priests had merely collected and distributed the bark near where they lived. By the mid-17th century, however, the priests often sent supplies of *Cinchona* to Rome, and travelers to Peru wanted the tree bark to take back to Europe for its value as a medicine. Just more than one century later, the Spanish port at Cadiz processed *Cinchona* bark that was harvested bark in Peru, Bolivia, Ecuador, and Colombia.

Directions: On your map, label the countries of Peru, Bolivia, Ecuador, and Colombia. Next to the countries, place a “Q” to represent the origins of *Cinchona* (quinine).

European governments grew tired of spending so much money on *Cinchona* bark and wanted to grow the trees themselves. Additionally, the supply of South American quinine did not meet the needs of all of the European explorers in the tropics. As a result, both the Dutch and the British sent men to South America to gather *Cinchona* seeds—often illegally, because the origin countries had specific laws regarding the removal of the *Cinchona* tree from South American soil. British and Dutch seed collectors sent their specimens directly to their countries’ **botanical gardens**. Some of these specimens were sent immediately to colonial India for cultivation.

Directions: On your map:

1. Label Britain, the Netherlands, and India.
2. Draw arrows from the four South American countries where *Cinchona* originated to Britain and the Netherlands.
3. Draw an additional arrow from Britain to India.

Part I—Mapping the History of Quinine

Lesson 6 Activity Master | page 3 of 3

The British experiment met with mixed results. In northern India, the climate was too damp for the *Cinchona* trees to grow well. In southern India and Ceylon, however, private planters produced millions of pounds of *Cinchona* bark. The Dutch, too, began experimenting with a different species of the *Cinchona* tree on the island of Java (present day Indonesia) and produced high yields of the bark. By the end of the 19th century, the Dutch established a near **monopoly** over the production of quinine by running the South American countries out of business.

Directions: On your map:

1. Label the Indonesian island of Java.
2. Draw an arrow from the Netherlands to Java.
3. Draw a star in Java and print “Quinine Monopoly” next to the island.

The quinine that was harvested in India and Java was used in the British and Dutch colonies to fight malaria. Quinine became available as a medicine to stop malaria in the middle of the 19th century. The supply and distrust of the drug did not wipe out malaria altogether. Still, quinine allowed Europeans to explore the interior of Africa. They soon “carved up” the continent for its abundant natural resources. The *Cinchona* tree helped Europeans get other natural resources that helped fuel their industrial economies at home.

Directions: On your map, draw arrows from India to Java to the interior of Africa, where Europeans relied on quinine to keep them healthy.

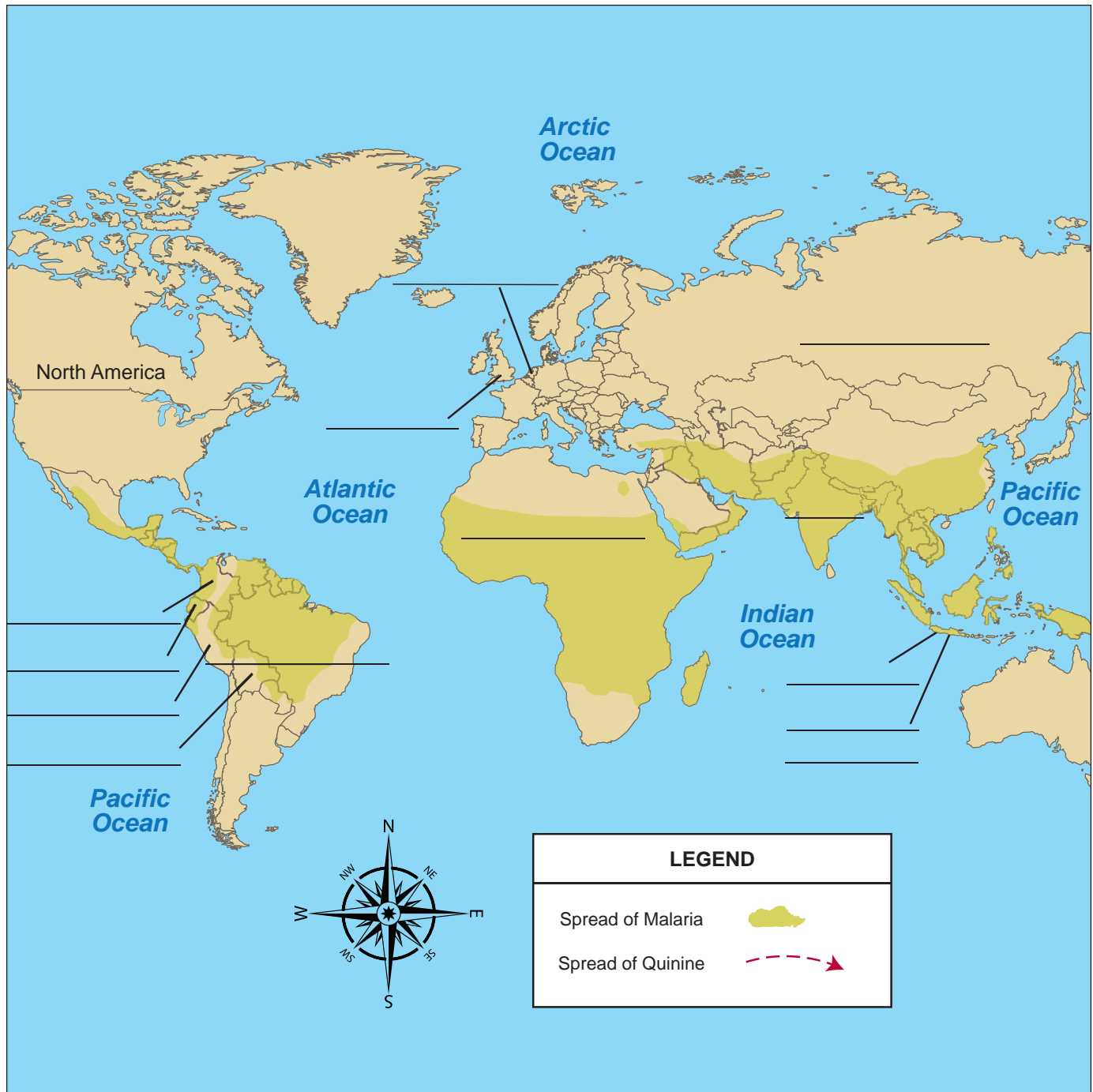
Quinine and the Global Implication of Imperialism

Lesson 6 Activity Master

Name: _____

Quinine and the Global Implication of Imperialism

Follow the directions on **Part I—Mapping the History of Quinine** to complete this map showing the spread of quinine during the era of New Imperialism. (1 point per port of entry and route, 10 points total)



The following excerpt from the House of Commons Parliamentary Papers is a response to several requests made by the Governor of India to the Honourable Court of Directors of the East India Company. It was to be considered a directive for immediate action.

Enclosure to No. 13

Minute by the Governor General, concurred in by the Members of Government; dated 20 October 1856.

This important subject engaged the attention of the Government of India, on the representation of the Agricultural Society, made to the Government of Bengal in 1852; and in consequence of a communication made to the Honourable Court of Directors, some seeds and plants were procured, and sent out to India.

The experiment failed, the seeds having in no instance germinated, and only five plants having reached Calcutta alive. These last, after having been kept at the Botanical Gardens during a rainy season, were sent to Darjeeling, where they were killed by the cold of the following winter.

In 1855 the Medical Board took up the question again; but their report by some accident not have been received, a duplicate has been called for, and at the same time the Agricultural Society have again addressed the Government.

The proposals of the Medical Board and of the Agricultural Society are, first, that the experiment of introducing *Cinchona* plants should be tried upon an extensive scale, with several species of the plants...

That officers possessing the requisite botanical and geological knowledge should be deputed to inquire as to the sites best calculated to receive the plants; that these officers, duly supplied with all aids and appliances, should receive the plants upon arrival, and convey them to the selected spots...

I submit that the substance of these proposals should be recommended to the favourable consideration of the Honourable Court. The supply of South American *Cinchona* is actually threatened with extinction; the consequence of the loss of this most valuable febrifuge (fever reducing chemical) would be most lamentable, and the experiment, if successful, would introduce into India an article which would be largely exported, and would be the source of a considerable revenue...

The experiment, carried out in the manner proposed, will be costly; but it is shown in these papers that in five years the Government of India has expended nearly 54,000 [pounds] in quinine and *Cinchona* bark, and therefore I believe that success will be well worth the cost; and looking to the political condition of the countries in which the plants are to be found, I doubt whether they can be surely procured in any other way...

Under these circumstances, and considering the incalculable benefits to be derived from having a native supply of this most valuable medicine at hand, I am of opinion that the experiment as proposed should be fairly tried, and that the Honourable Court should be moved at once to send a properly qualified collector to South America, to collect and bring to India the best species of *Cinchona*...

20 October 1856. (signed) Canning.

We quite agree.

23 October 1856. (signed) A. Dorin.

2 November 1856. J. P. Grant.

5 November 1856. B. Peacock.

Lesson 6 Activity Master | page 1 of 2

This lesson follows one natural resource, the *Cinchona* tree, as an example of the role that natural resources played in helping stimulate development of industrial economies. As the United States, Japan, and many European nations industrialized, other areas of the world provided natural resources to these nations.

1. What role did *Cinchona* bark play in the rise of industrial economies in the 19th century?

[illegible]

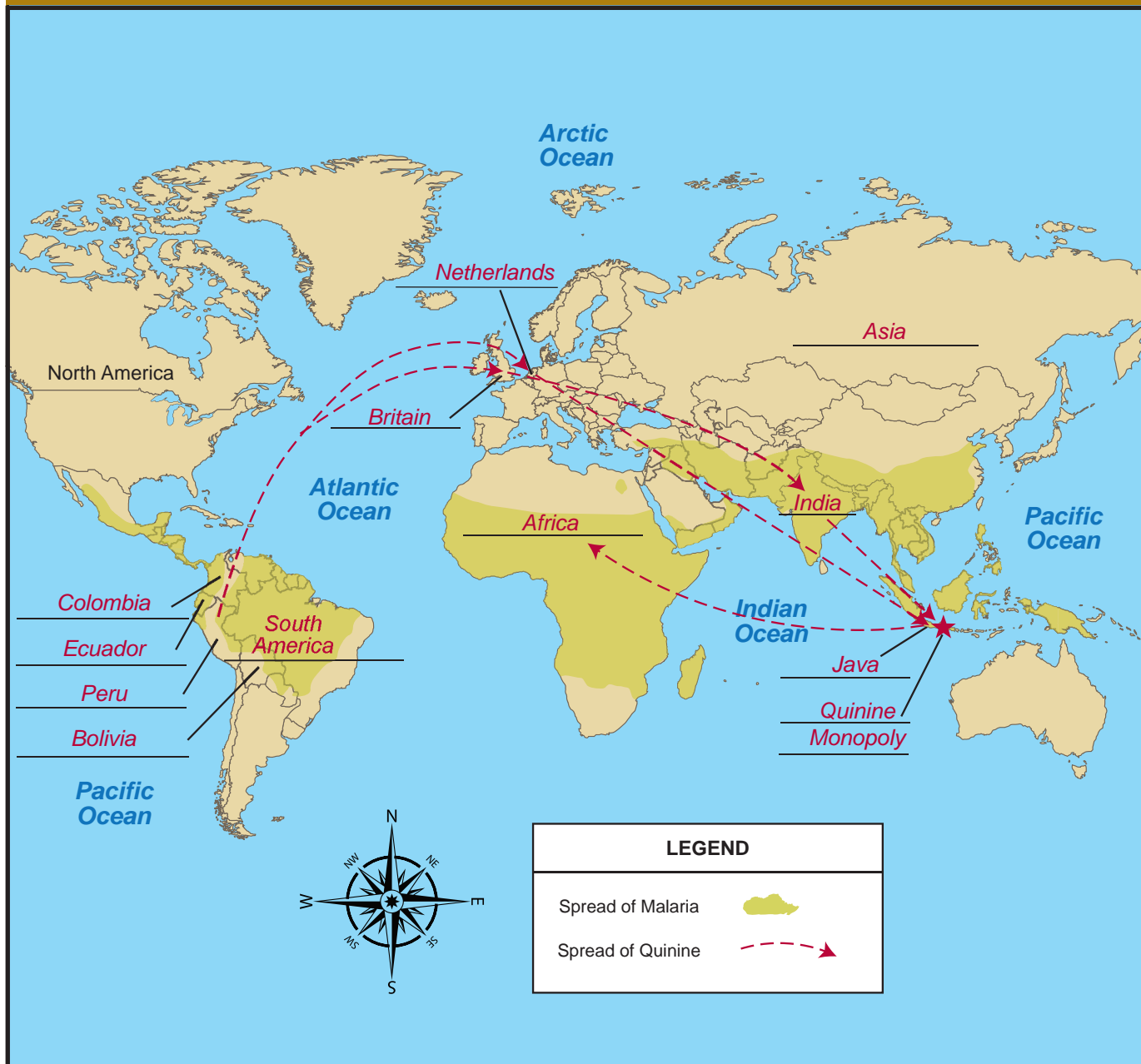
Part II—Putting It All Together

Name: _____

3. How did the desire for a continuous supply of quinine affect the decisions made by industrial powers about its control and use?

4. What role did the imperial governments play in controlling the world supply of quinine?

Quinine and the Global Implication of Imperialism



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